REPORT RESUMES

ED 013 525 EF 000 010

SCHOOLS AND INNOVATION--A PROLOGUE TO PLANNING.
BY- WIENS, JOHN L. AND OTHERS
RENSSELAER POLYTECHNIC INST., TROY, N.Y.
PUB DATE JAN 65
EDRS PRICE MF-$1.00 HC-$9.04 226P.

DESCRIPTORS- *EDUCATIONAL PLANNING, *INNOVATION, *SCHOOL ARCHITECTURE, HORIZONTAL ORGANIZATION, VERTICAL ORGANIZATION, USOE

PROVIDING A COMMON GROUND OF UNDERSTANDING BETWEEN EDUCATOR AND ARCHITECT IN THE PLANNING PROCESS IS THE GOAL OF THIS REPORT. CLOSING THE COMMUNICATION GAP BETWEEN THE TWO GROUPS IS ACCOMPLISHED BY DISCUSSING EDUCATIONAL INNOVATIONS. ABANDONMENT OF THE TRADITIONAL PUPIL-TEACHER RATIO FORMULA IN FAVOR OF VARYING GROUP SIZES IS SUGGESTED AS A SOLUTION TO SPACE AND PERSONNEL SHORTAGES. INDIVIDUAL DIFFERENCES AMONG STUDENTS ARE SUGGESTED AS REASONS FOR BREAKING LOCKSTEP TECHNIQUES WITH SUCH ALTERNATIVES AS NONGRADING, HOMOGENEOUS TRACKING, INDIVIDUALIZED SCHEDULING, AND INDIVIDUAL STUDENT PROGRESS. EFFECTIVE STAFF ORGANIZATION IS VIEWED FROM VARIOUS PERSPECTIVES SUCH AS TRADITIONAL, EXTENDED, MODULAR, OR STUDENT PLANNED PERIODS. EXTENSION OF THE SCHOOL DAY, WEEK, AND YEAR IS ALSO CONSIDERED. NEW CONCEPTS IN PLANT ORGANIZATION ARE OFFERED AS RESPONSES TO NEW PHILOSOPHIES OF EDUCATION. IMPROVED ADMINISTRATIVE AND COMMUNICATIVE PROCESSES, COMPUTER SCHEDULING, MECHANIZED LIBRARY SERVICES, AND NEW AUDIO-VISUAL MEDIA ARE INCLUDED AMONG THE INNOVATIONS DISCUSSED. WHILE MOST OF THE REPORT DEALS WITH THAT PHASE OF EDUCATION INVOLVING YOUTH, ATTENTION ALSO IS DIRECTED TO THE ROLE OF THE SCHOOL BEYOND TRADITIONAL BOUNDARIES. THE REPORT INCLUDES A BIBLIOGRAPHY FOR EACH CHAPTER. (RH)

ED013525

EF

EF 000010

SCHOOLS AND INNOVATIONS:
A PROLOGUE TO PLANNING

SCHOOLS AND INNOVATIONS: A PROLOGUE TO PLANNING

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

JOHN L. WIENS
STEPHEN C. WHITNEY
DAVID S. HAVILAND

The report of a directed research project undertaken by three thesis students in Rensselaer's School of Architecture, as an introduction to the field of educational facilities, and as an adjunct to an architectural research study sponsored by the U. S. Office of Education.

ARC

RENSSELAER POLYTECHNIC INSTITUTE :: JANUARY 1965

"Schools and Innovations: A Prologue to Planning" is the report of a directed research project undertaken by three students in the School of Architecture at Rensselaer Polytechnic Institute in Troy, New York.

The motive behind the study is two-fold. It is hoped that this survey of innovation in education and its implications for educator and architect might,

- Provide a common ground of understanding, upon which educator and architect can communicate in order to provide facilities that will truly support the educational program.
- Provide a wide background for the investigating team in order that their degree theses might prove to be significant contributions both in the fields of education and architecture. These theses will be undertaken in the Spring 1965 school term.

The project was undertaken under the auspices of Rensselaer's architectural research office, and as an adjunct to a study this office is conducting for the U.S. Office of Education. Members of the Rensselaer faculty serving as advisors for the project are Harry E. Rodman, Professor of Architecture, Morton C. Gassman, Associate Professor of Architecture, and Alan C. Green, Assistant Professor of Architecture and chairman of the advisory group.

j. l. w.
s. c. w.
d. s. h.

Troy, New York
January 1965

SECTION 1: ORGANIZING STUDENTS IN GROUPS

Why Consider Group Size? . . . 1 - 1
An Introduction . . . . 1 - 2
Large-Group Instruction . . . . 1 - 3
Multi-Class Teaching . . . . . 1 - 9

SECTION 2: ORGANIZING CURRICULA FOR INDIVIDUAL DIFFERENCES

Why Individualize Curricula?. . 2 - 1
Grading and Nongrading:
  A Perspective View . . . . . 2 - 4
Homogeneous Tracking . . . . . 2 - 8
Individualized Scheduling . . . 2 - 10
Individual Student Progress . . 2 - 15
Nongraded Curricula . . . . . . 2 - 25

SECTION 3: ORGANIZING STAFF FOR EFFECTIVENESS

Organizing the Staff . . . . . 3 - 1
Team Teaching and Planning . . 3 - 2
Echelon Organizations . . . . . 3 - 7

SECTION 4: ORGANIZING TIME FOR EFFECTIVENESS

Why is Organizing Time
  Becoming Important? . . . . . 4 - 1
The 'Traditional' Period . . . 4 - 4
Extended Time Periods . . . . . 4 - 5
Modular Time Periods . . . . . 4 - 7
Student-Planned Periods . . . . 4 - 11
Extended School Day and Week . 4 - 14
Extended School Year . . . . . 4 - 16

SECTION 5: ORGANIZING PLANT FOR EFFECTIVENESS

The Problems in Organizing the Plant . . . . 5 - 1
The Changing Role of the Plant. 5 - 3
Educational Parks . . . . 5 - 6
Schools-Within-Schools . . . . 5 - 11
Schools-Away-From-Schools . . . 5 - 16

SECTION 6: IMPROVING THE ADMINISTRATIVE PROCESS

The Problems . . . . 6 - 1
An Introduction . . . . 6 - 3
Computer-Based Scheduling . . . 6 - 4
Mechanizing Library Operations. 6 - 7
General Uses of Computers . . . 6 - 10

SECTION 7: IMPROVING THE COMMUNICATIVE PROCESS

The Need to Improve the Communicative Process . . . . 7 - 1
The Communicative Act . . . . . 7 - 4
Instructional Aids . . . . . . 7 - 6
Media . . . . 7 - 24
Learning Labs . . . . 7 - 35
The Library . . . . 7 - 39

SECTION 8: EXTENDING THE ROLE OF THE SCHOOL

An Introduction . . . . 8 - 1
Co-operative Education . . . . 8 - 2
Job Retraining . . . . 8 - 5
Continuing Education . . . . . 8 - 7
Education for the Culturally-Deprived . . . . 8 - 9
Extension Programs . . . . . . 8 - 13

SECTION 9: CO-OPERATIVE DEVELOPMENT OF RESOURCES AND SERVICES

The Need for Co-operative Development . . . . 9 - 1
An Introduction . . . . 9 - 3
Production of Aids and Media . 9 - 4
Co-operative Services . . . . . 9 - 8
Regional Research . . . . 9 - 11
Information Pooling . . . . . . 9 - 12

INTRODUCTION

IN-NO-VATE, v.i., [Lat., innovare, to make new], to make changes in something already established; to introduce new things.

-- Winston Dictionary

introduction

The Communication Gap Between Educator and Architect

As a result of the twin explosions of population and information in the twentieth century, the task of education has taken on vast new proportions. Coincident with these explosions has been an unprecedented public concern for the education of our nation. Together these three factors have forced a detailed exploration and analysis of teaching and learning; and as a result, a real "climate for change" has evolved. As part of this "climate," curricula and methodology have been revised, educators and psychologists have stepped up the probe into the nature of learning, and the technology of our times is beginning to produce the means for putting the thinking into practice. Finally local boards are seeing the need to devote time and money to research, supplementing contributions of foundations and governments.

The results of this "climate" have been a multitude of innovations in education. Seeking to fit the dual criteria of excellence and economy, new approaches have been suggested and tried in every conceivable area of the education field.

Innovation creates problems, however. First, the administrator is faced with choosing those innovations which will best fit his district's goals and objectives, a problem which must be solved within the education profession. A second problem is one which involves not one but two distinct professions: the need to build. Now the architect is brought into the tangle and turmoil of change. Not only must the educator try to sort out the innovations for his own benefit, but he must also try to convey them and their implications for facilities to the architect. The architect, too, finds that he must increase his familiarity with what is going on in the field.

Except in rare cases, neither educator nor architect has been willing to take the first steps to bridge the very definite gap which is developing between them. All over the nation new education programs are being attempted, for good or bad, and yet school facilities remain alarmingly insensitive to them.

The Objectives of This Report

The primary objective which has guided the authors in preparing this report is that of providing a common ground of understanding between educator and architect, a ground on which they can discuss and can make decisions as a prologue to planning school facilities.

In order to fulfill this objective, these intermediate goals have been established :

- To attempt to organize the wide range of innovations into a rough framework so that investigation and analysis can take place on an orderly basis.
- To attempt to isolate each innovation (although it is recognized that this cannot be the case in practice) in order to present a definition, an exploration into its nature, and implications for students, teachers, and facilities.
- To attempt to present these innovations as "building blocks" which can be put together by educator and architect, allowing them to realize implications for facilities before any actual planning of spaces takes place.

The Audience

Since its primary objective is an attempt to help bridge the communication gap between educator and architect, the primary audience toward which this report is directed is composed of men in these two fields. Qualifications are made, though,

- The educator, first of all, must be willing to take action to bridge the gap. Before making any decision to build he must develop an educational program for his district, he must have his goals and the methods for reaching them firmly in mind.

- The architect, too, must be willing to take action to bridge the gap. He must be willing to gain enough background in the field of education to intelligently and meaningfully discuss innovation with the educator. He must have a deep interest in providing physical facilities that will truly support the educational program.

A secondary audience to which this study is directed may include anyone really interested in the education of our nation, from the superintendent to the kindergarten teacher, from the board member to the district's youngest taxpayer.

Only a First Step

The key word in the title of this report is "prologue." It is expected that the audience of educators and architects for whom it is written will find it useful as a first step toward planning facilities that will complement the district program. For this reason, actual design studies and schemes are avoided -- rather it is hoped that interested educators and architects will be able to take the implications noted, and from them work out design solutions which will fulfill the needs of the individual district.

The Organization of the Report

SECTIONS

The innovations have been organized into broad Sections for purposes of presentation and discussion,

1 Organizing Students in Groups
2 Organizing Curricula for Individual Differences
3 Organizing Staff for Effectiveness
4 Organizing Time for Effectiveness
5 Organizing Plant for Effectiveness
6 Improving the Administrative Process
7 Improving the Communicative Process
8 Extending the Role of the School
9 Developing Co-operative Resources & Services

There is no need to read the Sections, or even the innovations discussed in them, in any specific order, the building-block approach is designed to allow each to stand on its own feet. It is suggested, however, that introductory material, consisting of problems and background information, presented in the first few pages of each Section be read before the individual innovations are taken up.

INNOVATIONS

The innovations discussed are, in turn, organized in terms of,

- A definition, and description of operation.
- How the innovation solves the problems presented at the beginning of the Section, and what new problems may be created.
- What organizational patterns may be implied.
- The effects on the roles of student, teacher, and administrator.
- The implications for facilities.

While each innovation is necessarily treated autonomously, the reader must be ever aware of the overlap which exists everywhere. Cross-reference has been used extensively, particularly in cases where innovations work well together, or where they may be fundamentally opposed to each other.

REFERENCES

No footnotes are used, and quoted material is referred to by title only. A complete bibliography of helpful materials is presented at the conclusion of the report. Since this listing is broken down by Section, the reader will note many multiple listings -- further evidence of this overlap among innovations!

Methodology Employed

As was noted at the outset, this report was prepared under the auspices of the architectural research staff at Rensselaer, which has been engaged in the field of educational facilities for a number of years, and which is currently conducting some research work under contract with the U.S. Office of Education. The methodogy employed in the conduct of the project and the preparation of this report included,

- Regular meetings with the advisory group (Professors Rodman, Gassman and Green) to discuss and analyze findings, and to exchange ideas.

- A review of current literature in the field, provided through the architectural research office at Rensselaer, the New York State Education Department, the New York State Library and others.

- Seminars and informal discussions with men and women in all areas of the field, including, school superintendents, principals, classroom teachers, educational consultants, district business managers, architects, electronics and technical consultants, and specialists in innovation, communications, and administrative services.

The Limitations

It must be noted at the beginning that the authors recognize several limitations built into this report.

First, the field is so far-ranging and so complex that it is virtually impossible to cover every facet and aspect in a study such as this.

Second, the drive to achieve comprehensiveness necessarily sacrifices detail and depth of coverage. As a result of this, many generalizations have been made and the authors realize that this often leaves room for unintended and unexpected interpretations. It is only hoped that they will be minimal.

Third, as students of architecture the authors have tried to avoid making value judgments on the various approaches. Unfortunately bias is a powerful phenomenon and strikes even in the most well-intentioned reporting. For this, apology is also made.

Finally, it must be reiterated that this report can hope to be no more than a first step -- a small one at that -- toward providing adequate physical facilities. It is hoped though, that it can provide some kind of beginning, some kind of take-off point for attacking the problem.

A Point About School Structure

In discussing the organization of schools and the elements that make them up, one point should be made at the beginning. As in the case of the proverbial child who insists on adding apples and oranges, too often we tend to compare unlike components of school organization,

- VERTICAL ORGANIZATION, which, as we will use it, deals with the methods the school employs to classify students and move them upward through time, from the point they enter until the point at which they leave. Grading and nongrading are vertical organizations.

- HORIZONTAL ORGANIZATION, which, on the other hand, concerns itself with ways of dividing the students among available resources -- teachers, courses, rooms, times. Team teaching and large-group instruction are examples of horizontal organizations.

Of course there are overlaps, and the distinction cannot religiously apply to every innovation that will be discussed. The "little school," discussed in Section 5, for example, combines elements of both organizations. Remembering the distinction, however, will help solve many arguments before they begin.

ORGANIZING STUDENTS IN GROUPS

1

WHY VARY GROUP SIZE?

Group Size -- The Key to Solving Certain Problems

The grouping of students is a key factor in meeting many of the growing pressures on education today. It gives the administrator the chance to manipulate students, teachers, and facilities not only to compensate for shortages of space and personnel, but it also provides many new learning experiences not available in the conventional classroom. By abandoning the 30-to-1 student-teacher ratio in favor of varying group sizes, the school may be better equipped to cope with these problems:

- The increase in the number of students in our schools. Not only is our population growing at a rapid pace, but the percentage of it in school continues to increase.
- A shortage of qualified teachers.
- A shortage of facilities which must be met by conversion, rennovation and new building.
- The demand for quality instruction to meet modern needs.
- The demand for a greater variety of subjects, and at the same time, a demand for greater integration of subject matter.
- The need to use new instructional aids and media to cope with the expanding body of knowledge.
- The need to further utilize existing resources and facilities to keep costs down.

AN INTRODUCTION

Breaking the Traditional Size of Groups

Aside from the pressure of the problems already mentioned, there are two forces which are literally opening the door for breaking down the 30-man classroom. The first is the need to provide a variety of sizes that will enable the learner to participate in a variety of learning situations. The ideal solution would be the changing of group size with every learning situation and with every student variable (age, maturity, ability, attention span, etc). Attempts at individualizing curricula, discussed in Section 2, virtually go this far in breaking down group size.

Visual aids and media, too, have had tremendous effects on group size. Comprehensive materials can be brought to the small class; and the use of these devices can greatly extend the size of the large class.

Large-Group and Small-Group

What is a large group? a small group? In discussing group sizes we will use intra-group communication as the dividing line between large and small. In groups of sixty or more, two-way communication becomes nearly impossible. In small groups of fifteen or less, this type of communication works best. In the middle area, from fifteen to sixty students, either one-way or two-way communication may be employed.

Since we are so familiar with the so-called middle (15-60) group mentioned above, this Section will deal primarily with Large-Group Instruction, and another method of combining students in small schools, Multi-class Teaching.

LARGE-GROUP INSTRUCTION

Defining the Large-Group

The term "large-group" instruction is broadly defined here to include instruction of many students (usually sixty or more) by one instructor. This may mean that the instructor works in the same room as the students in the large-group, or that he is broadcasting to them in different rooms. As noted in the introduction, the lower limit has been set by the large-group's inherent inability to foster real two-way communication; when one considers the possibilities of using commercial TV as a broadcast medium, the upper limit of the large-group may extend into the thousands!

Some Limited Response Permitted

Total one-way communication to the large-group need not always be the case. Response systems (discussed in detail in Section 7) are available to reinforce subject material and to allow some elementary two-way communication in the large-group situation. When the large-group is spread out in many different rooms and receiving the lecture by television, phones, or other means, two-way discussion is possible if the equipment is designed for it. The awkwardness of the situation, however, operates against "questions from the floor" in most cases. Another interesting effect of these limited response systems is that teachers, in anticipation of questions, work harder on presentation of material.

Complementary Seminar Groups

Despite some limited response in the large-group, most educators feel this situation really needs a complementary seminar experience in which the learner can take an active role. This also allows for explanation of lecture material, discussion on questions, and so on.

Many different "plans" for combining large-group experiences and then supplementary seminars have been tried; most have been quite successful. One educator, Dr. James Mosel notes that he gained a more effective learning situation by taking conventional hour lectures (given three times a week) and rescheduling time as follows:

- Twenty minutes of lecture
- Ten minutes allowed to answer three essay-type questions
- Fifteen-minute "buzz" session to resolve these questions
- Fifteen minutes allowed for questions on the lecture.

The results of this kind of scheduling were not only concise lectures, but immediate opportunities for reinforcement were provided through the discussion and questions.

Applications

Large-group instruction has been used for many years at the college level, allowing one staff member to lecture hundreds of students at a time, particularly in "core" courses.

The new uses of large-group instruction are at the secondary and even elementary levels. Schools such as Wayland High School in Wayland, Massachusetts, and Ridgewood High School in Norridge, Illinois, are using large-group teaching to satisfy more students with fewer teachers. Others are finding that some large-group instruction is possible on the lower levels, too; the primary difference lies in the reduced attention spans characteristic of youngsters.

The Teacher's Role

The role of the teacher in large-group instruction is, as conventionally, that of information-giver. He has been greatly aided in this task, however, by the development of instructional aids and media which allow him to have at his fingertips material for comparisons, reinforcement, detailed descriptions, and so on.

The invention of the video tape has given large-group instruction flexibility which was not possible in live broadcasting. The ability to tape a lecture, and then play it back at any time not only allows many runs of the same lecture (saving the teacher from repeating it over and over again), but also allows the teacher to see himself in action, to notice flaws, and give him opportunities for correcting them. Finally, taped lectures may be made available to an absent student at his own convenience.

One of the most stringent demands placed on the teacher in large-group instruction is the need for planning. The instructor must not only consider the nature and amount of material to be covered in the lecture, he must actually decide on the responses he is looking for; he will not find it easy to "play it by ear," patterning his presentation on class response.

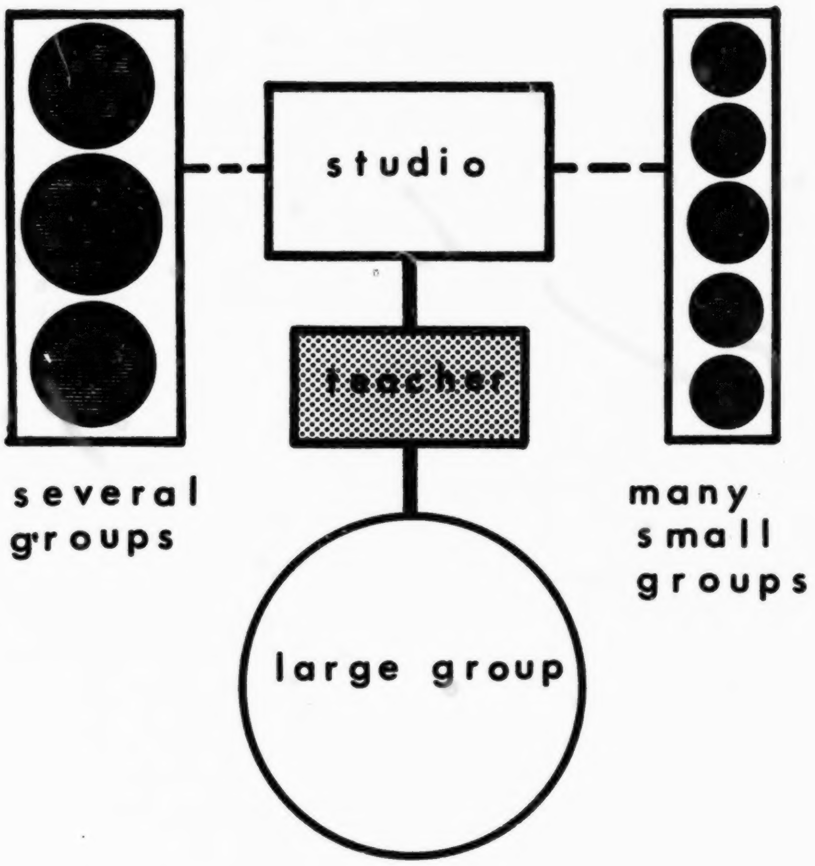
Time Spent in the Large-Group

The time alloted to large-group instruction in the school's program will vary with each school's educational objectives. The Trump Plan (see Section 3) implemented within conventional curricula advocates that 40% of the student's time be spent in the large-group. Dr. Edwin Read, a proponent of individual-centered curricula, on the other hand recommends limiting large-group activities to a mere 10% of the student's time; his argument is that if individual progress is the keynote of the school's program, large-group instruction really only finds value for initial presentations, guest lectures, etc.

Implications for Facilities

As has been noted, large-group instruction may be accomplished with both students and teacher in one large room, or with students scattered in different facilities.

Presentation of material by the teacher in the same room as all of the students generally implies a large lecture hall accommodating as many students as possible. This would economize on staff (only one teacher used) and space (only one room used for one period). The presentation via television, on the other hand, implies smaller spaces, perhaps even existing conventional classrooms. In this case, less specialized teachers might work with the studio teacher to handle questions and raise discussion points in the individual rooms.



The key to the entire question, of course, is one of economics. While the big room may be the answer in many respects, can it be economically justified? At what size does the amount of technical equipment for amplification and magnification become exhorbitant? Will such a large space be adaptable enough to get day-long use? In all cases the administrator must balance the factors of utilization, staff, subject matter, numbers of students, and available spaces in making decisions on how to best accommodate large-group instruction.

The Large Lecture Space

The large lecture space enjoys the advantage of placing the speaker in the same room as the students. High-quality instructional aids can be used without fear of losing their clarity or effectiveness over broadcast media. Materials and equipment for instruction are concentrated in one place, and need not be moved all over the school. Finally, there is no need to provide cable throughout the building if large-group activities can be confined to large spaces.

New Spaces for Learning, the result of exhaustive research into spaces for aids and media (particularly in large-group instruction), gives a general checklist of design considerations for large lecture spaces:

- An optimum viewing area, as defined by the various images to be viewed and viewing angles will determine effective room size.

- Stepped or slopped floors will provide the best viewing conditions in large rooms.

- Whether spaces are large or small, windows are a liability rather than an asset.

- All learning spaces should be air-conditioned.

- Proper acoustical treatment in rooms, and sound insulation between rooms is essential.

- Carefully-planned, special lighting is a prime essential to the proper functioning of large-group spaces.

- From the initial stages of design, the mechanical, structural, acoustical and lighting elements must be constructed together as a co-ordinated system.

- A conscious effort toward carefully designed color schemes in rooms is desirable.

- In designing the spaces, aids and media should be considered with instructional methods as integral systems rather than simply pieces of equipment to be included in the spaces.

- The concept of a co-ordinated display surface or "teaching wall" should be encouraged.

- Whenever possible, projection equipment should be located in a projection center or area, and should be remote-controlled.

- Both front and rear projection methods should be at least initially considered. The latter may be preferable since total darkening is not requifed.

- The question of one large projected TV image versus smaller monitors scattered throughout the room should be considered; the first is considered to be more desirable.

- The adjunct facilities (storage, preparation, etc.) should be also considered in design.

- The flexibility and convertibility of the space should be carefully thought out ahead of time.

New Spaces then proceeds into actual design studies of large-group spaces developed using the above as guidelines. A classroom was then built on the Rensselaer campus to test the principles and make modifications as needed.

The Smaller Spaces

While the smaller spaces lack the presence of the instructor and may require monitoring, they can be made effective, particularly where money is saved by utilizing existing facilities. Utilization is further enhanced since spaces of this size are more adaptable to different kinds of activities than are large-spaces with their sloping floors and permanent fixtures.

The ideal seminar room should house about fifteen students. Above this number, the size of the group and the distance between them simply does not allow for effective discussion. One advantage of seminar spaces is that they can often be "put together" within existing spaces by using moveable dividers, etc.

Other Considerations

Another influencing factor in the design of any large-group space is external circulation. Not only will these rooms be used by teachers and students from all over the school, but they also tend to "dump" large numbers of students from their doors at the period change. Circulation spaces around the rooms should, therefore, be ample.

MULTI-CLASS TEACHING

A Definition

Multi-class teaching can be defined as instruction of one or more subjects to more than one group in the same room, at the same time, by the same teacher.

This concept allows small schools to offer programs and courses that would normally be considered uneconomical to administer to only a few students. Large schools, too, may increase the number of courses and combinations offered by using multi-class methods.

Implied in this concept is the existence of a certain amount of flexible scheduling during the school year to meet student needs as they arise. Undoubtedly, too, the types and amount of multi-class teaching will vary widely each year.

The Teacher's Role

The multi-class teacher must be able to handle many activities at the same time. There will be demands made on teachers that are not normally found: he will have to be well-versered in not one but several areas of a discipline. A language teacher may be teaching three different languages in the same room at the same time; he must be both a specialist and a generalist.

To perform at top efficiency, the multi-class teacher must plan his lessons carefully, with the progress of each individual well in mind. Much of the success of this kind of teaching depends on his ability to stimulate many students in a variety of directions. Such teaching implies creativity, planning, and hard work.

Applicability of Multi-class Methods

Multi-class teaching can be applied at a variety of levels; Designs for Small High Schools spends a great deal of time and effort in pointing up and providing design studies to support the various possibile combinations.

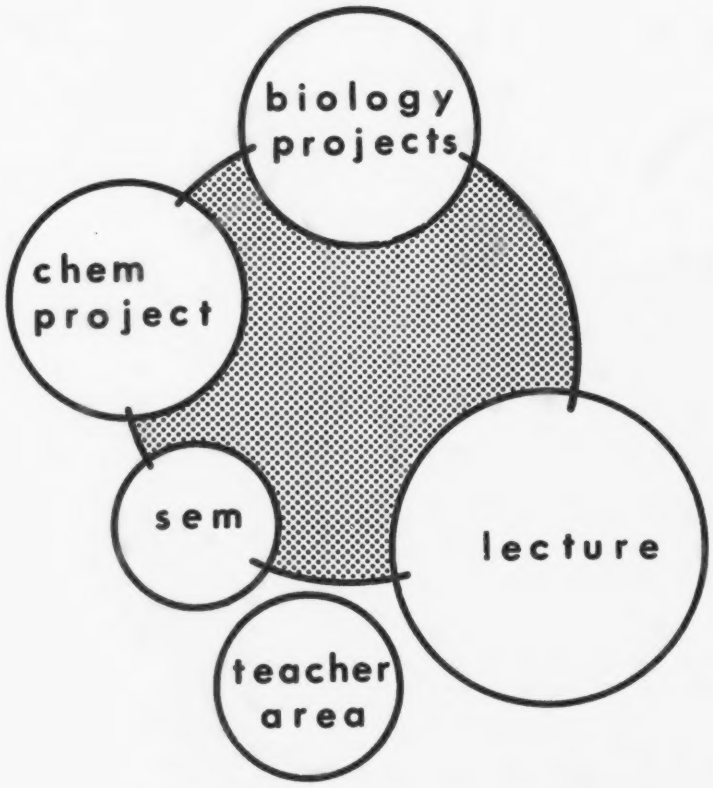
The Student's Role

In multi-class teaching the student is more responsible for his own learning. In language instruction, for example, one-third of a class may be using a text, another third being taught by the teacher, and the last third using machines. This intensely active environment will require concentration on the student's part.

Facilities

The implications for facilities are complicated by the temporary patterns of multi-class teaching from one year to another. In any case, some generalizations can be made:

- Rooms should be less specialized; an elaborate chemistry lab will serve well the large school, but the smaller school may need to utilize a general science lab with alcoves for the various discipline areas.
- Teachers must have a side space or small office adjacent to the learning area to plan activities and confer with students.
- Multi-class spaces should accommodate similar uses even if they are not all related to one discipline. An audio lab, for instance, may also be used for foreign languages, english, and instruction in using business machines.



SCIENCE CLASSROOM

ORGANIZING CURRICULA FOR INDIVIDUAL DIFFERENCES

2

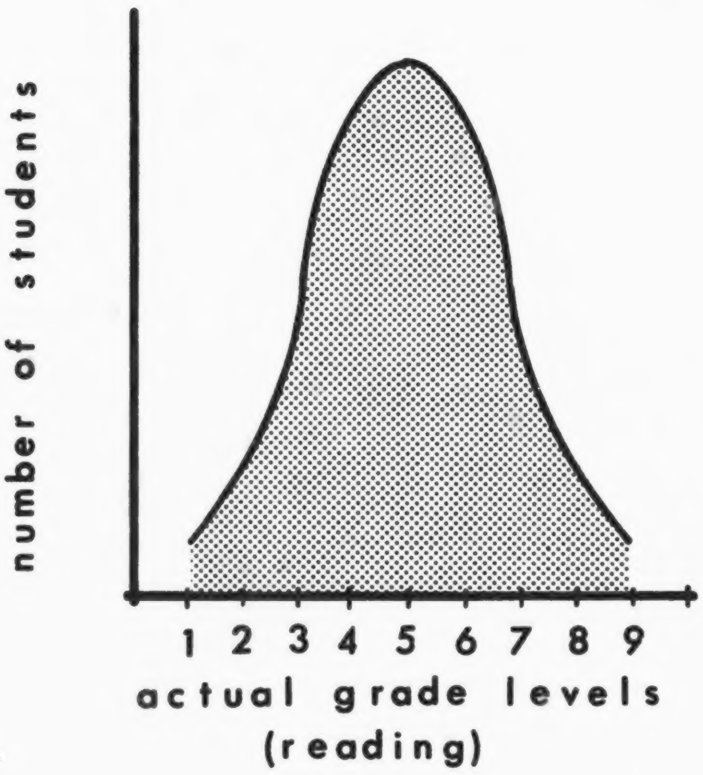
WHY INDIVIDUALIZE THE CURRICULUM?

The Concern for the Differences Among Individuals

In recent years, the psychologist and the educator have been most concerned about the problems caused by individual differences, particularly those in regard to the assimilation of information.

The summarization of a great deal of data seems to indicate these significant points:

- Children enter our first grades with a three to four year range in abilities and in readiness to profit from our "graded minimum essentials curricula" today.
- This initial spread in abilities is likely to double by the time that the same group of children approaches the end of elementary years.
- Achievement levels within the individual may vary widely from learning area to learning area.



A 5th GRADE CLASS

What factors give rise to individual differences? A wide range, both internal and external to the learner, are involved. In the first category we note that the relationship and "balance" of chronological, mental and emotional ages within each individual varies. Also, there are many degrees of mental and physical shortcomings in individuals that contribute to differences. In the second category, external factors such as the socio-economic background of students, and the local educational situation can be significant as causes for differences among individuals.

The Concern About "Failure" and "Repeating"

The traditional concept of failure in our schools is based on the failure of the student to achieve, within a given time, certain levels of mastery of subject matter. These are levels which, according to theory, a "normal" student should be able to attain.

The psychologist who is aware of individual differences, on the other hand, takes issue with the idea that anyone is truly "normal" and would prefer to redefine failure as the failure of the student to grow in terms of his own organic pattern -- that is, in terms of his own native ability and rate of growth -- toward socially desirable goals.

If the second definition is considered valid, just who is responsible for failure? The student? The teacher? The school?

And finally, why is failure and repeating objectionable? First, it seems wasteful to force a student to repeat a whole year's material when he may actually have retained a great deal of it the first time. Also, it is considered that repeating can often be destructive of mental hygiene, that the repeater often develops defense mechanisms and generally antagonistic behavior. Finally, it is realized that promoted slow-moving children achieve at higher levels, are much less aggressive toward school, and get along better with their peers than non-promoted children.

Utilizing the Students' Potential

We must attempt greater utilization of students' capabilities, potentialities and interests than we are now doing. Why shouldn't these factors, inherent stimulants to learning, be exploited rather than plowed under by the curriculum and by teaching methodology?

The Need to Discipline

With increasing emphasis on the problems of "dropouts" and "intellectual waste" in our schools, how can the curriculum provide the forces to motivate, to stimulate the individual to higher goals? Can the curriculum aid in disciplining the student (or, better yet, help him to discipline himself), both in education, and in other areas of human behavior?

Curriculum Research is Contradicting "Lockstep" Methods

Modern research into curricula and the learning process as a whole goes a long way to contradict traditional "lockstep" (arranging students in rigid grades) methodology.

First of all, curriculum theory is supporting the thesis that learning is continuous, that it proceeds along a "horizontal continuum", if you will. Therefore, forcing a student to arbitrarily stop learning at the end of a year (whether he is ahead of, or behind the "normal" pace) is out-of-line with this thesis. Another point to remember is that learning, while continuous, does not proceed along a straight line; there are bound to be many irregularities along the way.

It has also been suggested that the time or level at which children are taught specific facts makes little difference when compared to the importance of introducing the facts coincident (or shortly after) the controlling concepts have been mastered.

Finally, the learning process attempts to relate each learning experience to the other. Just how long it takes, and just in what order a child begins to realize these interdependencies is a very personalized thing. A teacher lecturing to thirty children at once can only assume that these relationships are coming at the same rate -- quite a foolish assumption considering what we know about individual differences.

GRADING & NONGRADING

A PERSPECTIVE VIEW

A Vertical Structure

Both grading and nongrading have one important point in common -- they are ways of vertically structuring the educational program. Their interest lies in providing a path for the student from the time he enters school to the time he graduates from it. We must be careful not to confuse these aims with those whose prime purpose is to divide up students and teachers in the most effective ways, the process of horizontally structuring the school.

Why Grading in the First Place?

Before launching into a lengthy discussion about "breaking the lockstep", perhaps we should take a look at the graded school; on what basis it exists, and what the trends have been in the United States in the past century.

Grading is actually a medieval concept that found nearly universal acceptance in this country in the 1840's. From the standpoint of the educator, there are many logical reasons for the graded school:

- In the 1840's the people felt that the needs of society, and therefore, the needs of the learner, could be best served by a simple program of elementary education.

- Knowledge and skills available to the learner, and those actually needed by him, were much more limited than they are now.

- It seemed reasonable to package fundamental facts and skills by degree of hardness. The evolution of the printed textbook deeply underscored this theorem in education.

- There was a lack of real insight into differences among individuals. Differences in achievement were usually chalked up to differences in willingness, in intelligence, or in just plain ambition.

- Grading is a handy administrative device; and, once established, the inertia to break away from it became tremendous.

Basic Assumptions Which Underlie the Graded Schools

Therefore, we can say that the graded school seems to make these basic assumptions:

- Elementary and secondary schools should always cover a specific body of subject matter.

- This subject matter should be rigorously identified and prescribed.

- Individual differences merely determine one's chances in the race to cover the material.

The Trends Away From the Graded School

People have not always been happy about grading. John Goodlad and Robert Anderson, themselves vigorous twentieth-century proponents of nongrading, note that forces to break the lockstep existed in some isolated cases as early as the 1860's.

A quick historical summary might look like this:

- Pupils in grades by chronological age (1850)

- Supervised study increasingly prominent by 1910.

- Winnetka and Dalton Plans (1919-1920) lend some emphasis to individual development.

- Offering of elective courses prevalent by 1925.

- Homogeneous Grouping by I.Q. begins (1930)

- Rise of "core" curricula and general education studies seen from 1945 to 1950.

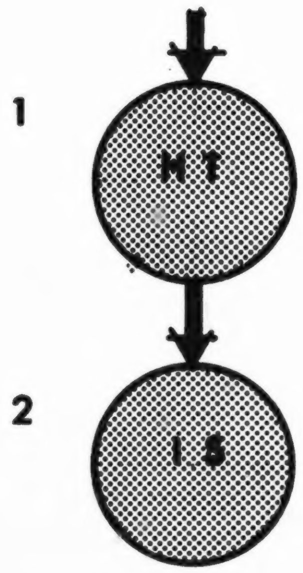
- 3- and 4-track plans begin to evolve in the 1950s.

- Totally nongraded curricula seen by many as the natural end result of this development. Some plans tried in the 1960s.

Organizing the Approaches to Individualizing The Curriculum

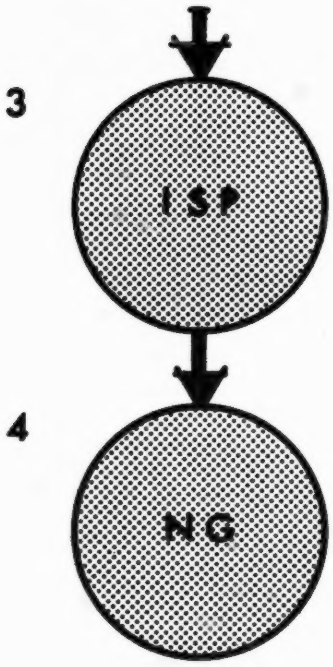
We will approach the breaking of the lockstep in much the same way that history has; each of the so-called steps goes a little farther toward recognizing individual differences and in providing an individual-centered curriculum. The most far-reaching solution so far proposed, nongrading (with all its good and bad points) will be discussed last.

Many of these approaches have been accepted as autonomous solutions to the problems presented. This may be because educators feel that the approach is sufficient to answer the problems, or because administrative problems at least temporarily preclude the adoption of farther-reaching approaches. We shall discuss each as both an autonomous approach, and as a step toward attaining the more far-reaching goals.



STEP 1 - HOMOGENEOUS TRACKING begins to provide for differences by dividing students into groups based on ability or achievement.

STEP 2 - INDIVIDUALIZED SCHEDULING allows the student some freedom in selecting courses or programs tailored to his interests.



STEP 3 - INDIVIDUAL STUDENT PROGRESS enlarges on these concepts by allowing the student to progress at his own rate and capacity through some grades or courses within the graded framework.

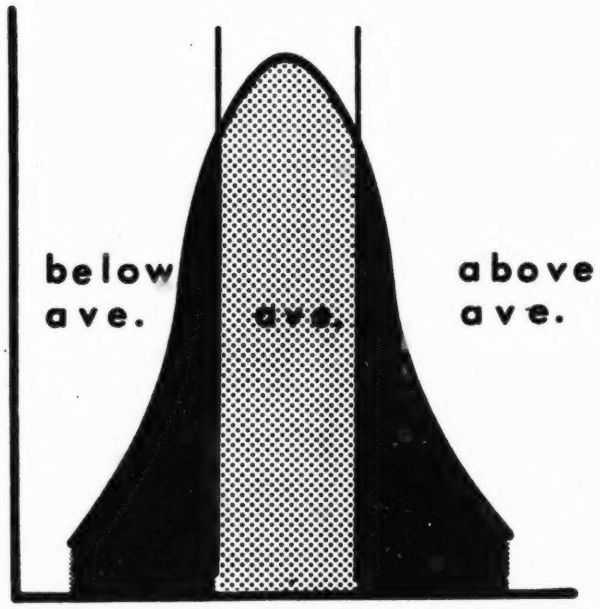
STEP 4 - NONGRADED CURRICULA allows each student to progress to his own rate to the point of totally eliminating "courses" and "grades".

Because of the interdependencies of each of these approaches on one another, it is suggested that this entire section be read as a unit, rather than as a collection of separate topics.

HOMOGENEOUS TRACKING

Using Homogeneous Tracking or Ability Grouping

Homogeneous Tracking, or Ability Grouping, has been quite widely used in our schools for two decades now. It attempts to divide grades or classes into their components based on achievement, or ability to achieve. A fifth-grade class of ninety, for example, may be divided into three sections; above-average, average, and below-average. The theory is that the teacher of each group can apply instructional techniques that "fit" the group; the gifted students may spend more time doing individual or small-group projects, while the slower learners can receive remedial instructions.



ABILITY LEVEL

As an attempt to begin to recognize individual differences, homogeneous grouping has had much to recommend it; no longer would instruction be always geared to the middle element, allowing the slower student to fall by the wayside, or the talented student to languish unchallenged. As a staff organization, too, ability grouping allows teachers who are especially talented to work with slower students, decreasing the possibilities of failure and needless repeating. Teachers who never could be bothered by the slow child can have the opportunity to handle faster-moving students.

Proponents of schemes calling for wider recognition of individual differences (individual progress plans, nongrading, etc.) tend to frown on ability grouping as an autonomous approach to the problems. They say that,

- The homogeneous group is a myth! While statistics show that there is usually a substantial middle segment, and then easily identifiable fringe groups, there are too many factors involved to always group students this way.

- Grouping students by general achievement levels is likely to disregard the learning-area variations within individuals.

- Ability grouping is generally unequipped to meet subtle changes in understanding.

- Frequent changes and regroupings should be made or the student will be aware of his ability "niche". This may cause discouragement and a general loss of motivation to learn, or may promote an overblown need to compete.

Just how these conflicts are resolved is up to the individual school. There is little doubt that homogeneous tracking really only scratches the surface of individual differences because it rarely provides a truly individual-centered curriculum.

Homogeneous tracking may be an integral part of other more far-reaching approaches, however. It is widely used for temporary grouping of students in individual progress and nongraded programs.

The implications for facilities are not easy to note in black and white. One point is clear, though, and that is if different sections of the same grade are to receive entirely different means of instruction and study, the facilities should be adaptable enough to provide for this. If gifted learners are allowed to do independent work, facilities for these activities (discussed under "Individual Student Progress" in this Section) must be provided. If special aids and media will be provided for both the gifted and the slow, facilities must be considered.

INDIVIDUALIZED SCHEDULING

A Second Step

We will consider individualized scheduling as a second step in "breaking the lockstep" of the traditional school. Essentially, individualized scheduling (as we will treat it) takes place in a graded system and allows the student more range in selecting courses and sequences. This is generally in opposition to what most schools are doing; that is, the fitting of students to college-prep, commercial, or technical "tracks". While these tracks are often elaborately designed, the requirements are usually pre-set and rarely adjusted to the interests and abilities of the student. Individualized scheduling hopes to move away from these restraints and give students the chance to accommodate their interests and abilities by selecting courses of their choice.

Solving the Problems

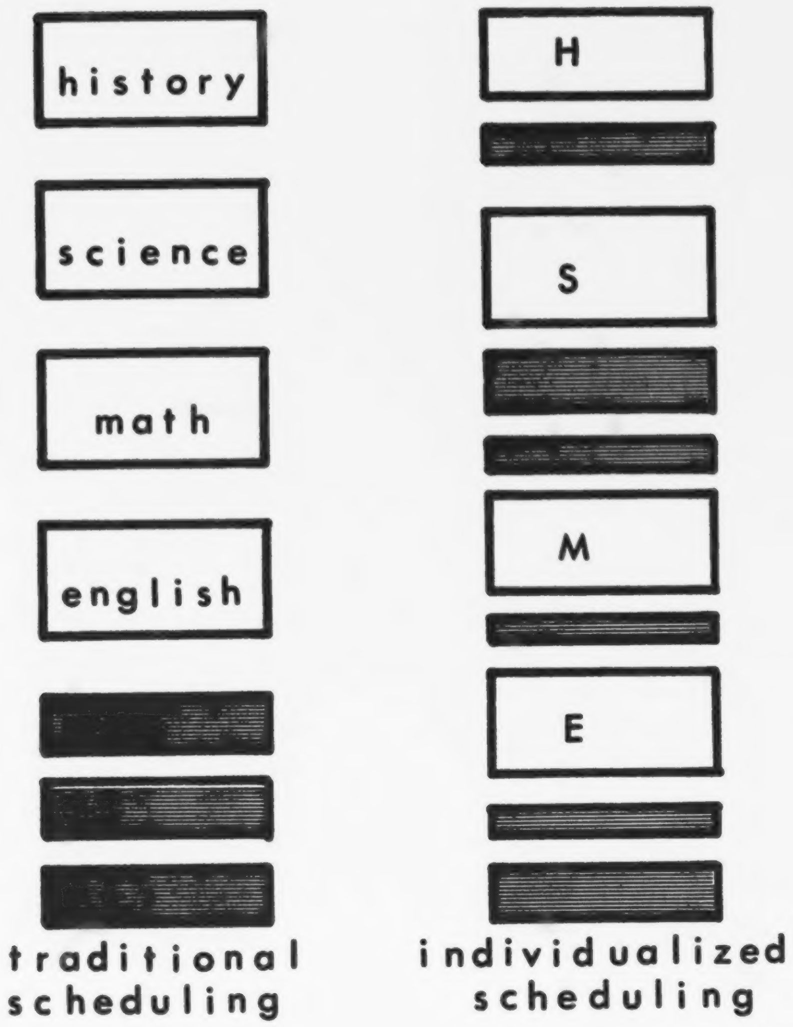
As an autonomous approach to solving the problems presented, individualized scheduling has some limited applications. What it does recognize is that student interests are points to be capitalized upon, not just passed off as inconsequential. Beyond this, individualized scheduling makes little allowance for the problems of individual differences and changes in curriculum theory.

Students under a plan such as this will probably do well in those courses they have chosen on the basis of their interests. They are also more likely to receive a better foundation in the areas which will cover their life's work. Unfortunately, the chances of failing other essential courses still remain and the reasons for failing them are still unresolved.

Organizational Patterns Implied

Individualized scheduling can be adopted into any existing vertical framework. The various horizontal patterns that may be used to implement it will also vary with the situation. Certain patterns are clear, though.

What is likely to happen under this approach can be summed up in three phrases: MORE COURSES, FEWER STUDENTS IN EACH, and VARIATION FROM YEAR TO YEAR.



While the traditional large-size courses in the more basic subjects will dominate the program, splinter courses will probably become more numerous. These are small-group courses covering specific topics and geared to the needs of students taking them.

This is bound to place more emphasis on seminars and individual projects as instructional techniques. Multi-class teaching (see Section 1) are likely to be used as approaches so that a large expansion of staff is unnecessary.

Large-group instruction may be used in the more basic courses in order to give teachers more time to handle the splinter groups.

Time, too, may be affected by individualized scheduling. With more courses offered by the instructional staff, and with more emphasis on individual work, it may seem practical and even necessary to have these classes meet less than five times a week. Various means of scheduling this kind of program are discussed in Section 4.

Some Limitations

The chief problem in individualizing scheduling lies in accommodating the various splinter groups mentioned above. They will force the school to economize on its resources (staff and facilities) in order to allow students the privileges of taking more courses, different combinations, in different sequences.

There is a good chance that scheduling problems will be introduced, the degree of which depending on how far the program is carried. A discussion of solving these problems is presented in Section 6.

Another problem that might be introduced may have to do with college admissions eligibility; the school and the student have to be aware of these requirements (they are often very basic, leaving little room for electives) and, as long as they carry weight, work within them.

Effects on the Student

Because some consideration is given to the student's own interests, there may be immeasurable gains in motivation and attitude toward learning resulting from implementing this approach. One thing is certain, there is bound to be a general broadening of the curriculum, which would seem to be quite healthy.

The student will become less single-group oriented in his everyday doings. He will probably not remain with the same homeroom group, or the same ability group all day long.

There are likely to be opportunities for independent study and individualized instruction for the student. He may have a chance to make more of his own planning decisions.

Effects on the Teacher

Individualized programs will have the effect of placing more demands on the teacher. No longer may he, for example, be teaching a History III course to ninety students. Of these ninety, seventy-five may remain in the history course and the other fifteen may either be taking different courses in other areas, or following up special interests in history. In the latter case, our history teacher is more than likely to be the advisor to the small groups, giving him two or three different courses to conduct rather than one.

While he may not have to spend as much time in preparing lectures and so on for these smaller groups, he will have to be prepared to guide them. The seminars and small-group discussions, however, may be much more challenging and rewarding to the instructor than the large-group teaching.

Effects on the Administrator

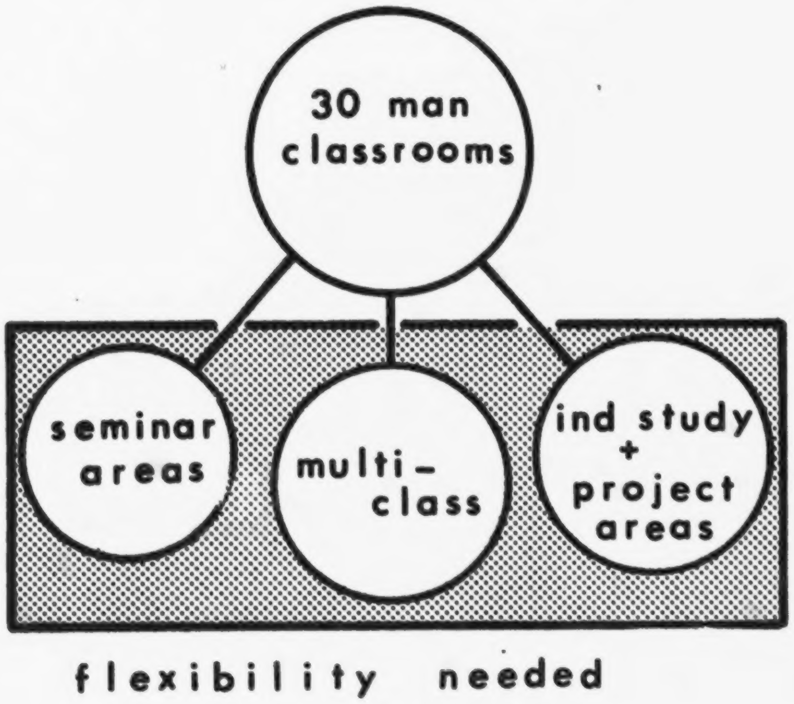
When one contrasts the rather simple problems of setting up the traditional five-prescribed-courses-a-year- secondary curriculum with that of providing for a "core" program with a myriad of branches and sequences, one can see what the administrator is up against. In essence, it is the same type of problem that faces the registrars of liberal arts colleges, which have been employing individualized scheduling for years.

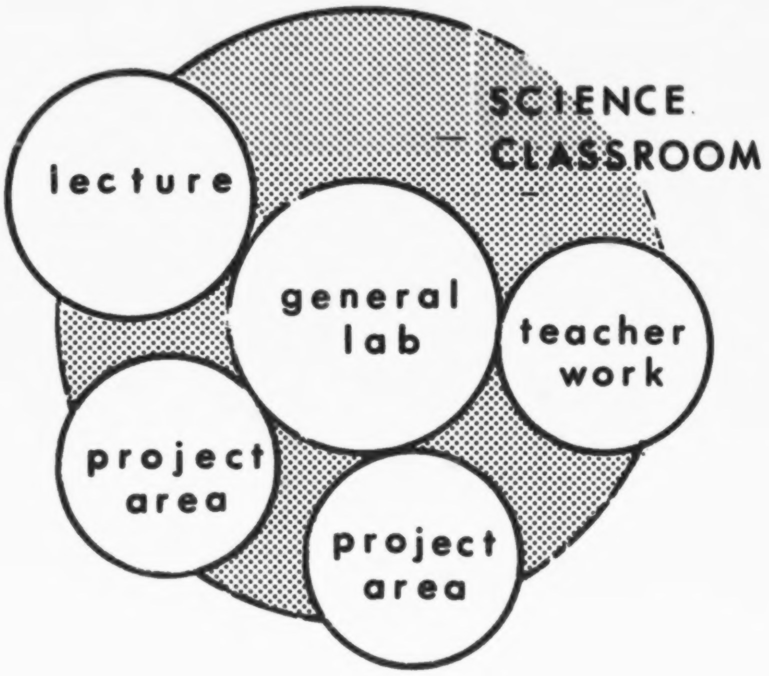
Finding a staff which does not object to the "spreading itself out thinly" cause the administrator some sleepless nights too. In any attempt to individualize curricula, however, the problems of staff, scheduling, and utilization of facilities are likely to be the source of unending problems for the administrator. A way out of these problems might be the use of computers for scheduling and utilization studies. (See Section 6)

Some Implications for Facilities

The points to remember here are our three key phrases: MORE COURSES, FEWER STUDENTS IN EACH, and ANNUAL FLUCTUATION. While many traditionally-sized spaces will still be needed, some new ones (or new adaptations of existing space) will become necessary:

- Seminar and small-group discussion areas will be needed. Existing classrooms may be used as is or divided to provide these spaces. Partitions need


30 man classrooms
seminar areas
multi-class
ind study + project areas
flexibility needed


SCIENCE CLASSROOM
lecture
general lab
teacher work
project area
project area

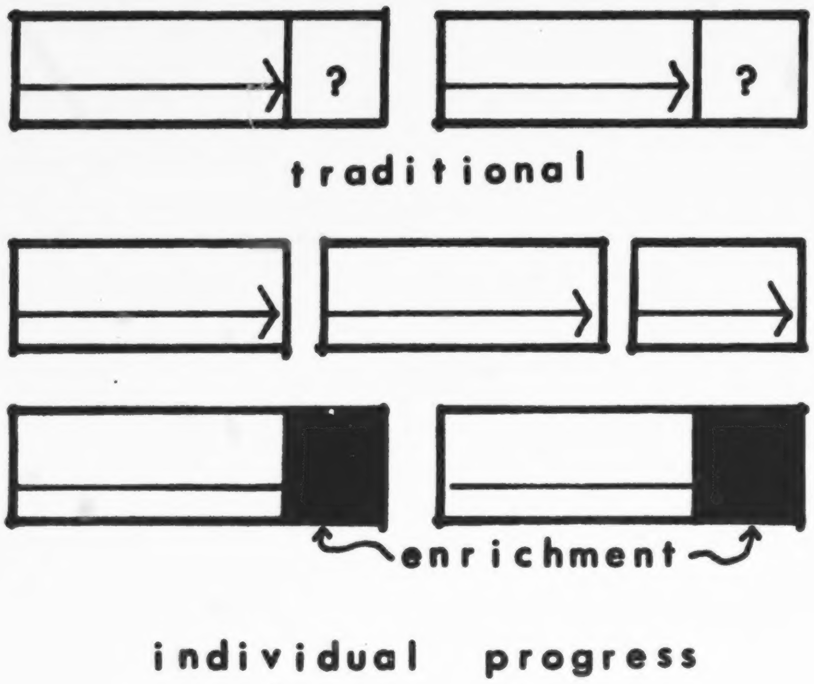
not and should not be immovable considering the annual fluctuations.

- Individual project areas, or areas in existing labs that may be set aside for long-term projects are likely to be needed.
- More emphasis will probably be placed on areas for individual suudy and access to information. A detailed discussion of these kinds of facilities appears under the next topic in this Section 2.
- Multi-class teaching spaces (or at least the principles behind them) may be helpful. They are discussed in Section 1.
- Administration areas may have to be increased to handle the scheduling load (see Section 6).
- Spaces for media such as programmed instruction may be necessary.

INDIVIDUAL STUDENT PROGRESS

Allowing for Individual Rates and Capacities

For the purposes of this discussion of individual-centering curricula, we will consider the concept of individual student progress a third step forward in "breaking the lockstep". It comes closer to recognizing individual differences than did individualized scheduling, since not only does it attempt to individualize the program, but it allows for individual rates and capacities within that program.



Within a graded framework, this concept lends emphasis to individual differences by allowing (some) students to progress at their own rates in (some) courses. Once the school has gone all the way in allowing for individual student progress we will consider it non-grading, which is discussed as the next topic.

The diagram contrasts the idea of individual progress with that of "teacher-paced" instruction, which is the rule in most of our schools. By allowing the student to move at his own speed, there is either more time for enrichment, or a new course may be begun.

Solving the Problems

Individual Student Progress is the first approach discussed in this Section that really begins to make provision for individual differences in rate and capacity. The goal of this concept is to allow students, even within the framework of courses and grades, to get as much as they are capable of learning from the course.

This allows gifted students to pursue in depth, and the slower learner to take this time and learn the presented information without fear of having to repeat the entire course or grade as a result of not reaching a pre-set standard.

Allowing the student to progress at his own rate and capacity should also give him the chance to discipline himself. His goals have been set as a result of his ability to reach them, and it becomes up to him to satisfactorily perform the task.

Since the student, and not the teacher, is in full control of discerning the relations between the concepts he has learned (an idea compatible with modern curriculum theory as we have noted), learning is bound to be more effective. The presence of the graded-framework, however, may still discourage a truly continuous learning process.

Individual Progress and Independent Study

Many times these two terms are confused, or mistakenly used interchangeably with each other. Perhaps the distinction is best made at this point. Independent study, as either an adjunct to formal classroom instruction or as an autonomous notion, is simply what it says it is; students are allowed to spend time doing independent work. This does not imply individual progress as far as the curriculum is concerned. The concept of individual progress, as defined above, however, does imply a certain amount of independent study and work. Hence, our discussion of facilities for independent study is included in this topic, although other approaches discussed elsewhere in this report may also carry implications for them.

Approaches to Individual Progress

The school can adopt any number of approaches to the use of individual student progress plans within its curriculum. It may consider it strictly as an adjunct activity, used as a supplement to regular course instruction. Or, to go deeper, individual progress may be scheduled through certain units or parts of courses. Going even farther, entire courses within the curriculum may be set up for individual progress through them. Finally, entire years may be set aside (particularly on very low levels, or on very high levels such as graduate school) for individual work.

Setting up Individual Progress

There are many organizational techniques through which this concept may be implemented:

- It may be accomplished in a conventional classroom through self-study and enrichment programs within the context of the regular curriculum.
- It may involve setting-up small sub-groups to explore various sidetracks, or to pursue certain points in depth.
- Independent study "periods" may be set aside to allow students to progress at their own rates through various courses.
- Large-group, small-group and independent study sessions may be used. The latter two will undoubtedly be the more important; and large-group instruction will be used primarily to initially present material, or for supplementary lectures if the entire course is set up for individual student progress.
- Conventional middle-group and large-group lectures may be extensively used if the individual progress aspects of the course lie mainly in "in-depth" exploration for those who are capable.
- Use of programmed media is not essential, but it can not only remove a good part of the burden from the teacher, but also provide for truly individualized instruction.

- The staff is very likely to be reorganized in teams or committees to properly organize, co-ordinate and supervise individual progress. Teacher cycling (staying with students longer than the normal semester or year) may be utilized to see that the teacher is totally familiar with the individual nature of each student.

- More personalized evaluation techniques will have to be utilized to chart progress.

Some Limitations

The greatest limitation in establishing curricula designed to provide for individual student progress is administrative and staff support for the program. Not only must the staff have a good working knowledge of the theory behind individual differences and the need for individual progress plans, it must be behind the program all the way if it is to succeed. It becomes the task of the administrator and faculty leaders (such as department heads) to lead the campaign for full staff support. Another element which may need some convincing is the parents; they must not be allowed to get the impression that individual progress is a means to "giving the children what they want" or of "getting the children off the teacher's back for a while".

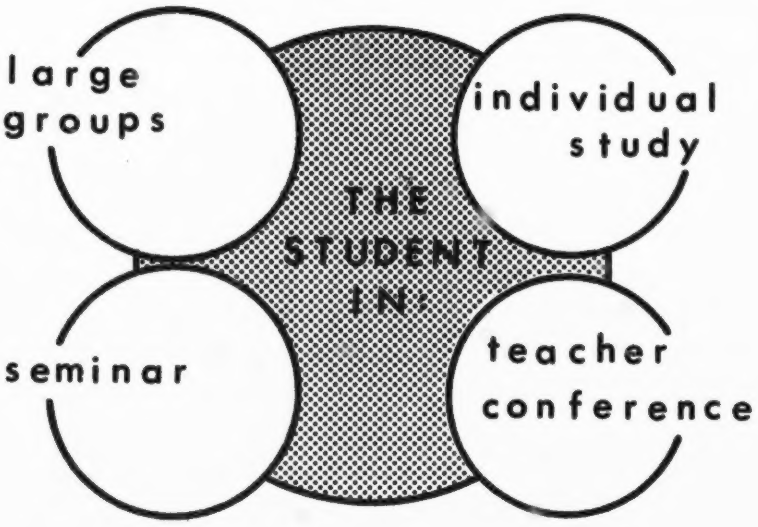
The means and media through which a program fully allowing for individual rates and capacities (if that is the school's aim) must be investigated. Fortunately individualized teaching methods (such as programmed instruction) are becoming well-perfected and economically within the grasp of the school.

If total allowance for individual rates is made, the chances are that the 50-minute time period, held sacred for so long, will undergo a drastic revision, perhaps to the point of total elimination. If the aim of the school is only to provide individual progress as an adjunct to more conventional curricula, however, this may not necessarily be the case.

The staff and administration may have to take steps to handle the increased complexity of scheduling and tracking student progress. New evaluation criteria must also be studied and used if this concept is to be fully effective.

The Student's Role

For the first time, the student is likely to face a role different from that of an impassive listener during the classroom lecture. He is likely to see himself in the light of many different roles, first as a listener in class lecture, then as a participant in a seminar or conference, and finally as an independent worker serving a tough master; himself.

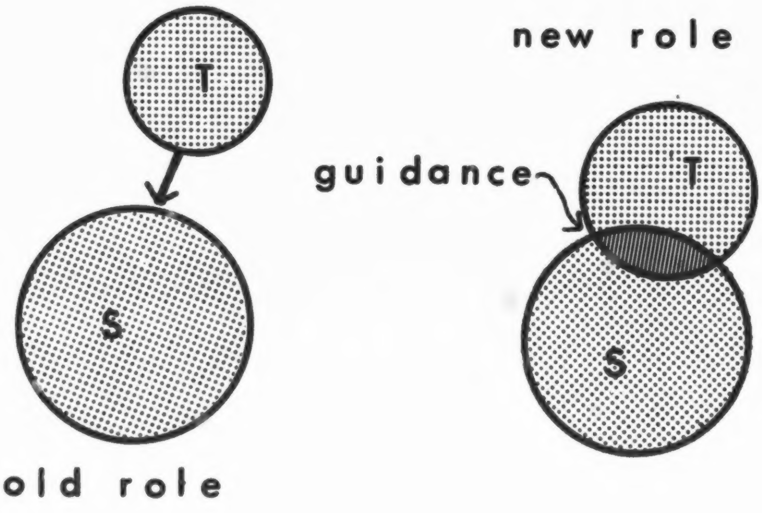


In many cases, the student should find the individual progress plan an increased motivation to learning, since he will not be forced to fit what others call "normal" progress patterns.

The student should have a greater say in planning his own work, and in learning to discipline himself to accomplish realistic goals.

The Teacher's Role

The role of the teacher should begin to shift from that as an imparter and source of all information to that of a counselor, guide, and director of learning activities.



The teacher will have to take a far more personal interest in each student; and he may be cycled to permit this to happen. The evaluative role will increase and become more subjective as the program is pushed farther.

The teacher must totally understand the theory behind the principles of individual progress if it is to be at all effective.

The teacher may be forced to abandon old syllabuses and outlines in favor of new approaches to meet the challenges of his students.

Giving the student the opportunity to explore in depth likewise increases the demands placed on the teacher to discuss and evaluate these investigations.

If programmed media are to be used, the teacher should be freed somewhat to spend more time with students who will profit most from the contact.

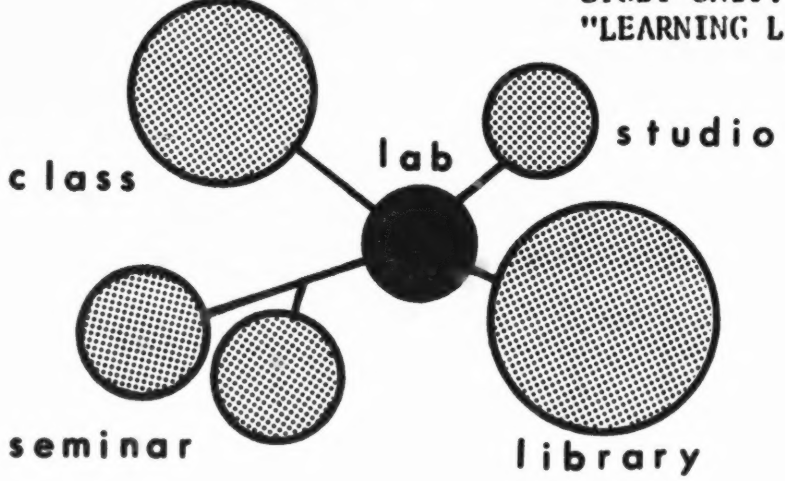
The Implications for Facilities

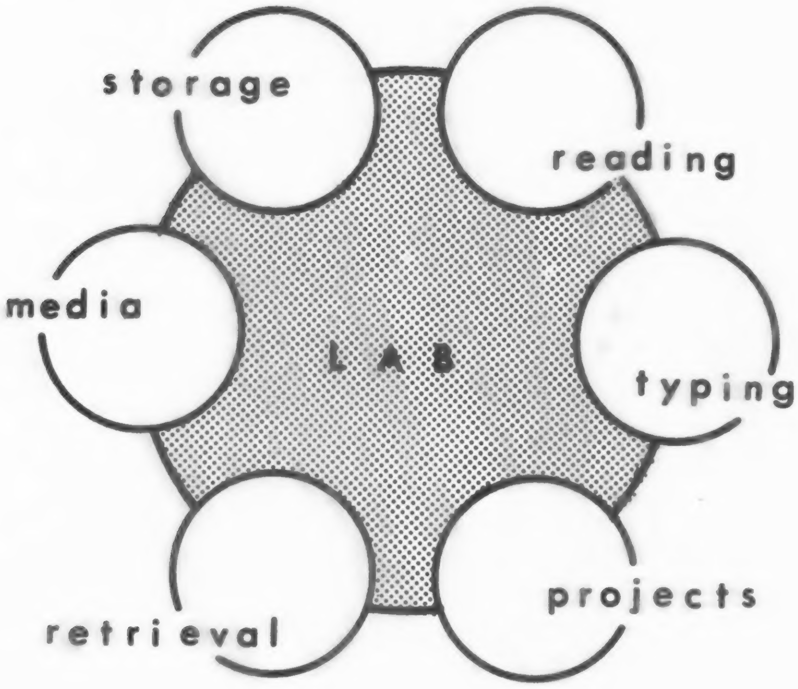
The excursion that the school will have to make into providing new facilities will, of course, depend on the degree to which it applies individual progress in its curriculum. If it is to be used adjunct to regular class instruction, the only important implication for facilities may be in the area of the library, since individual access and use of information will undoubtedly have to be enhanced. If, on the other hand, entire courses or grades are to be established on the basis of individual progress plans, whole new types of facilities will have to be hewn out of the existing plant, or provided for in a new one.

FACILITIES FOR INDEPENDENT STUDY AND FOPE

A. AN INDEPENDENT STUDY UNIT: THE "LEARNING LAB"

Some facility will have to be provided which can be a kind of private area for the student. In order to maintain continuity throughout, we will call this a learning lab, although it may not necessarily serve all the functions ascribed to it as discussed in Section 7.





Where homerooms remain the primary social units (as they do in most instances where individual progress plans are adopted within the graded framework, the learning lab unit will probably not be assigned to a particular student as it would have to be if no homerooms were provided. Likewise, the number required would depend on the extent to which the plan is used.

An important factor is the function to which these learning labs will be put. A simple carrel with a writing surface and a certain amount of visual privacy may suffice.

If, on the other hand, the learning lab is to be used for functions other than quiet reading or writing, other factors may have to be considered.

- Acoustical isolation: Noisy activities such as typing, science projects, etc., may require isolation so as not to interfere with surrounding noise levels. In all cases, the lab itself will have to be sufficiently isolated from outside noise.

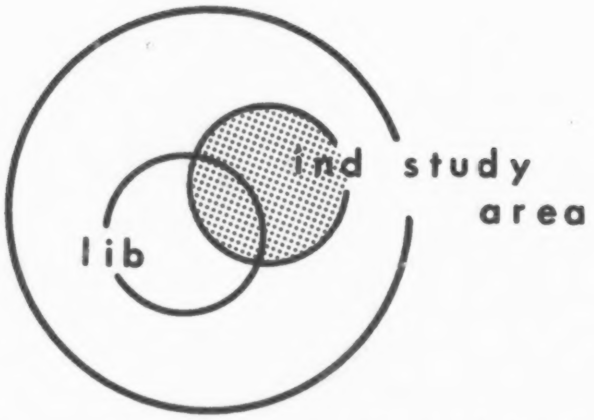
- Lighting: If a great deal of enclosure is needed for acoustical purposes, light may have to be provided on an individual basis. In all cases, lighting levels on the working planes must be sufficient. Exceptionally bright or glare-producing lights and surfaces must also be avoided.

- Services: What services will be needed will depend on the desired functions. In learning labs designed to support science experiments, for example, gas, water, and waste will have to be provided.

- Use of Media: Many of the media discussed in Section 7 could find use in individual study spaces, and would have to be designed for. There is the possibility that these lab units would have to be clustered in order to economize on wiring, etc.

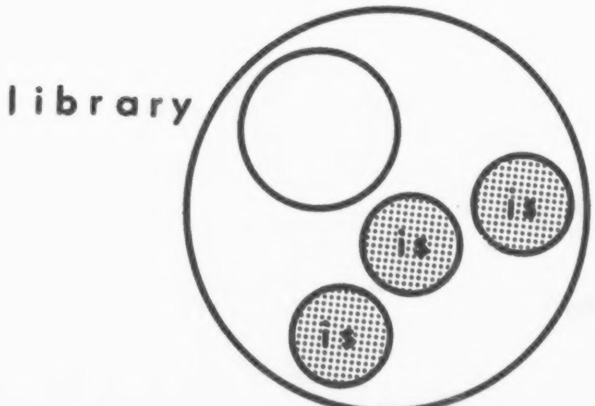
- Storage space: As required in the unit, it would vary according to use and whether or not the lab is permanently assigned to a specific student.

There are also implications for grouping these learning labs or independent study units:



centralized

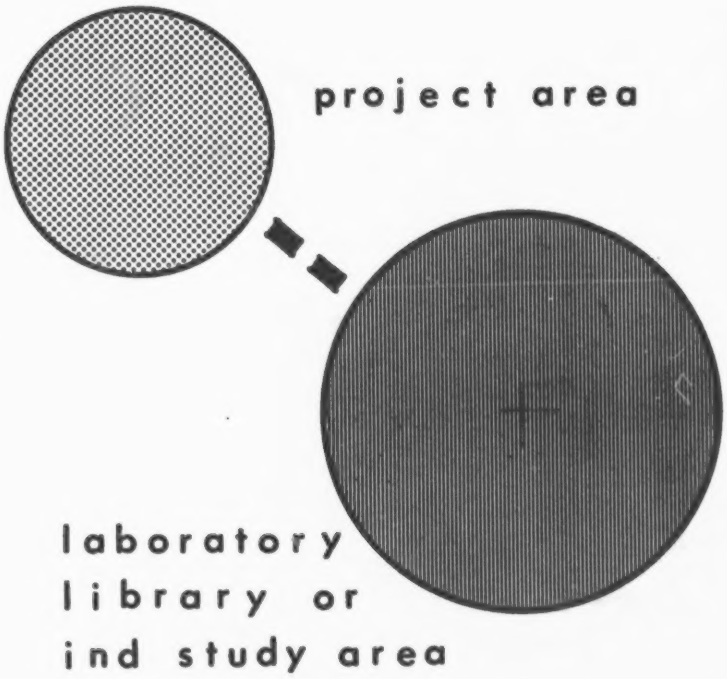
- The units may be grouped together in a large center, possibly related to the library. The primary advantage lies in being close to information sources. Also, electronics services, etc., can be economized on if the units are centrally located. The major problem is one of sheer size and the overwhelming effect of cramming dozens of these units together.



decentralized

- The learning labs may be spread throughout the plant, either in random fashion, or clustered around discipline-oriented resource areas. While the advantages of centralization are lost, the units may be more convenient to laboratories and work spaces, and the 'scale' may be more human.

B. PROJECT AREAS It may also be desirable to locate individual project



areas for experiments and investigations requiring privacy and undisturbed apparatus.

Either small project areas or benches with locked storage facilities may be provided within the laboratory or learning area; or adjacent project rooms may actually be designed into the plant. One school emphasizing independent study has located several 8' x 11' lockable project rooms in its building. Colleges have traditionally provided these spaces for independent research.

FACILITIES FOR DISCUSSION & GROUP PROJECTS

While individual progress plans may place a heavy emphasis on independent work, there are times when the individual is ready to profit from group discussion and exploration. Where individual progress is used for enriching more traditional learning forms, small-group discussion may be even more important.

At any rate, there must be places where seminars can be held, both formally and informally, in the school. The facilities may even be of a very temporary nature, since the need is likely to change from year to year, and even from day to day. Existing classrooms may be provided with movable partitions, or even a large multi-use space (such as an old gymnasium) may be converted into a number of project areas where acoustical privacy may not be necessary.

THE LIBRARY

As we have mentioned, it becomes paramount that each student who is under an individual progress plan have ready access to information and learning resources.

The library, as we will continue to call it throughout this Report, must expand its facilities, both in terms of types offered and in numbers accommodated. Its location must be central if it is to be well used (that is, the possibilities of "information-retrieval" systems that will be discussed in Section 7).

It would also seem reasonable to expect that full utilization of the library for individual progress demands that this facility be made available to the student for longer hours.

A fuller discussion of the role of the library is presented in Section 7.

OTHER IMPLICATIONS

Other implications for facilities to support individual progress may include,

- The need for testing and evaluation spaces where a student can go, at his decision, to be tested. This is necessary when whole courses are being taught by programmed instruction.

- Spaces for the various media (see Section 7).

- Spaces for large-group and conventional group instruction. Number and size depends on the instructional program employed.

- Spaces for teachers may need to be provided if they are not given desks in the homerooms. While a office or studio would be preferable, it would be hard for the school to justify the expense, unless it adopts individual progress on a large scale. A discussion of this type of facility is presented under Non-grading.

- Administrative spaces, possibly for data-handling if the scheduling problem requires it. See Section 6 for details.

NONGRADED CURRICULA

The Nongraded School

In the words of B. Frank Brown, in his The Non-Graded High School, "A nongraded school is a place which makes arrangements for the individual to pursue any course in which he is interested, and has the ability to achieve, without regard to either grade level or sequence". Further, these systems attempt to provide for the continuous, unbroken, upward progression of all pupils. No arbitrary repetition of work is imposed, and non-promotion is not used. Teachers, not pre-set standards, are supposed to determine the rates of pupil variability.

Nongrading attempts to provide for the irregular aspects of this upward progression that is typical of all learners. Theoretically it makes no compromise in recognizing the need to adjust for individual differences.

The nongraded curriculum also provides several alternative vertical placements for any child at any time, none of which can be associated with "failing" or "skipping" a grade.

A Vertical Structure

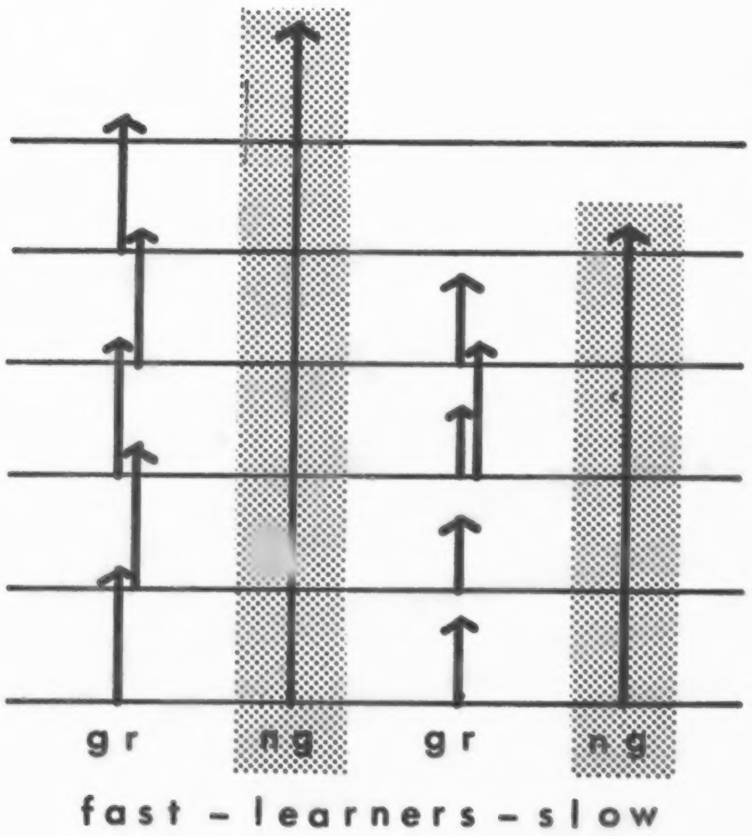
The primary point that must be remembered is that nongrading is a vertical organization; as we have noted, its interests lie in moving the student through school, from start to finish. Within nongrading, therefore, many horizontal approaches may be taken. Team teaching, for example, is a horizontal approach which can be implemented within the framework of nongrading. It is not really directly comparable to nongrading, though, since this would harken back to the age-old parable of comparing apples and oranges!

Solving the Problems

For many reasons, many feel that nongrading is probably the most satisfactory approach seen so far in attempting to solve the problems presented.

Nongrading provides for continuous progress to the extent that ideally all grade lines are wiped out and there is no "failing" as we know it. The school considers that the only reason for failure to realize one's rate and capacity can be a lack of motivation on the student's part. No material is presented twice and the social and mental problems associated with traditional failure rarely occur.

By facing a set of tailored, realistic goals, it is hoped that the learner can discipline himself to reach them -- a discipline which should ideally be carried over into his everyday behavior.



First of all. There are no jumps, back or ahead - the student is not faced with conforming to grade standards - and a true "horizontal-continuum" curriculum is easier to implement. Also, facts can be presented coincident with the concepts supporting them. There can no longer be the axiom that "multiplication is a third-grade subject, but division must wait until the fifth grade". Finally, the fact that the burden of learning lies squarly on the shoulders of the learner allows him to realize the interdependencies of the facts learned himself; no longer does the teacher have to assume that all thirty students are "getting" the material at the same rate.

Proponents on nongraded curricula also point out the graded curricula tend to foster an artificial and unnatural homogeneity of age and academic experience within the age group. The nongraded approach has the advantage of broadening pupils' outlooks by exposing them to different age and ability groups at the same time.

Solving these problems as well as proponents would like is obviously a tall order. The fact that nongrading has a start on all of them is a point in its favor. As in any new system, however, it is probably true that some of the theory loses a little in translation into practice.

Applications at Different Levels

While nongrading will mean different ways of doing things when applied at different levels, it can and has been adopted at all of them. Of course, the college as we know it is really an ungraded school (although individual progress may not be as well provided for as it could). Total credit requirements replace individual requirements for each of the years, although grading remains as an administrative device.

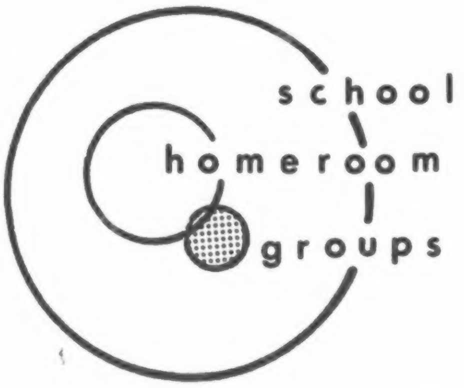
While it may be desirable to adopt nongrading on lower levels first (since student attitudes have not already been formed), a great deal of research must go into just how the system should be implemented. Young children are likely to have more variable social requirements as far as group size is concerned; one minute they may like being alone, and in the next, the security of a larger group is needed. In any case, it has been shown that younger children need both, so large blocks of individual study time simply cannot be built into the schedule.

On the other hand, the early years are advantageous from the standpoint of considering the already integrated nature of the material presented in these years.

There is one limitation that must be considered if nongrading is to be practiced on any kind of scale at all; what happens to the child who starts out in the nongraded school and has to move and enter a "lockstepped" school? With the mobility of our population on the rise, this looks to be a real problem. Some have considered its solution in terms of a national standard, a phrase that immediately antagonizes most educators. So far, the limited scale on which nongrading has been adopted has not dictated the need for an answer to this problem.

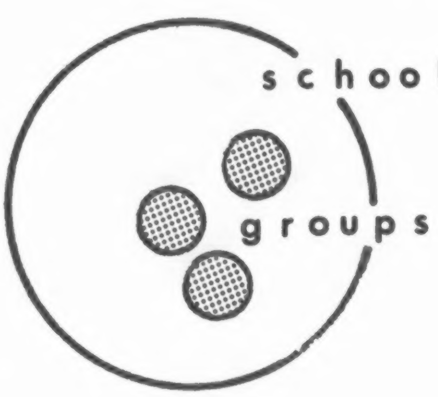
The Various Organizational Patterns That May be Applied

As we have noted, there are any number of horizontal organizational patterns that may be used to implement nongrading. Just which are best or most helpful has yet to be accurately determined. Some are:



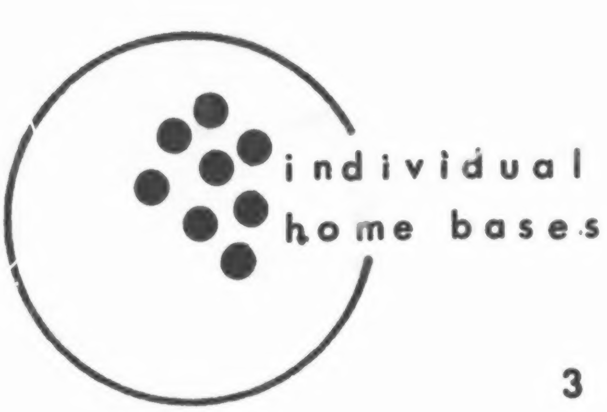
1

- The Goodlad and Anderson approach which can be incorporated into existing facilities by (1) using the classroom as the basic social unit but not designating it by grade, (2) grouping thirty students heterogeneously in this room with a teacher, and (3) letting the teacher vary sub-groupings with the various projects, perhaps cutting across homeroom lines to form the groups.



2

- The division of the curriculum into large, perhaps 3-year blocks. Within the blocks, various groupings such as ability grouping, achievement grouping, interest grouping, multi-age grouping and even groupings based on work-study habits may be used. While no one method can be called the best, an effective situation can be provided by varying the means of grouping from project to project.



3

- Almost no social structure at all, using the carrel as the student's "home base".

The curriculum and the years spent in school, too, may be handled in different ways, such as:

- Dividing the school continuum into larger segments, still based on traditional "levels' of learning:

  Primary
  Intermediate
  Middle
  Secondary
  Higher

- Or, by setting up a general area of focus covering a number of years such as that pro-posed by Dr. Edwin A. Read in his Continuous Progress System:

  Entrance Division
  Cultural Division
  Pre-specialization Division
  Specialization Division

  In each of these cases, the level or division would be designed to cover a specified number of school years (say, three for the normal student), but students would take as long as necessary to complete each division before entering the next.

- By dividing discipline-oriented curricula into "phases" instead of discrete courses. Rather than set up the math curriculum as a collection of discontinuous courses (such as Algebra, Geometry, Trigonometry, etc.), there may simply be Math - Phase A, Math - Phase B, and so on. The phases would be totally integrated approaches, and the student would be assigned the proper phase in accord with where he actually is as he progresses through "Math". The final phase in any discipline area may be a totally independent-study oriented one, almost comparing to a college thesis.

Other organizational patterns may include:

- Some large- and middle-group instruction although its importance will be greatly diminished. What will be needed, however, are many small-group situations where students who are ready to profit from group experience may meet to discuss and work.

- Examinations taken at the request of the student rather than the teacher. The student will decide when he is ready to be tested on a certain unit. Some of the tests may be in the form of oral interrogations to allow the teacher to closely evaluate material learned.

- More flexible scheduling, practically doing away with the traditional 50-minute time period and allowing for more spontaneous scheduling of activities. The proposal made by Dr. Read along with his Continuous Progress System is discussed under "Student-Planned Periods" in Section 4.

- Teacher teaming and/or cycling will most likely be used to accommodate nongrading since teachers can better relate their talents to those of the learner (if they are teamed), and then can stay with them long enough to get to know them well (if they are cycled).

- The Educational Park (see Section 5) concept may be handily applied to nongrading since it allows for the easy transfer of students on the same site.

- Some of the new media that are implied but not absolutely necessary to the success of nongrading are those lying in the field of programmed instruction (see Section 7) which can lift some of the burden from the teacher.

- To order, classify, and to track student progress through the nongraded school, the administrator may have to utilize computers to ease the burden. (see Section 6).

The Student in the Nongraded School

The role of the student has been changing as curricula become more individual-centered. The most significant point to note is that the nongraded system places the burden of learning square on the shoulders of the student. No longer can he be a passive participator, his chin on his hands, pretending to pay attention to long lectures. He must be an investigator and an experimenter if he is to get anything out of the curriculum. He may have more time and control in planning his own learning activities.

The student will not see himself as a member of a clan of thirty, but as a participator in large groups, small groups, and finally in independent study. He will find that he must, above all, learn to live with himself.

The desk-in-a-single-classroom idea will be no more. Learning will be spread out in a number of facilities. From the start, mobility and flexibility will have to be accepted as a way of life, replacing the security of the traditional classroom.

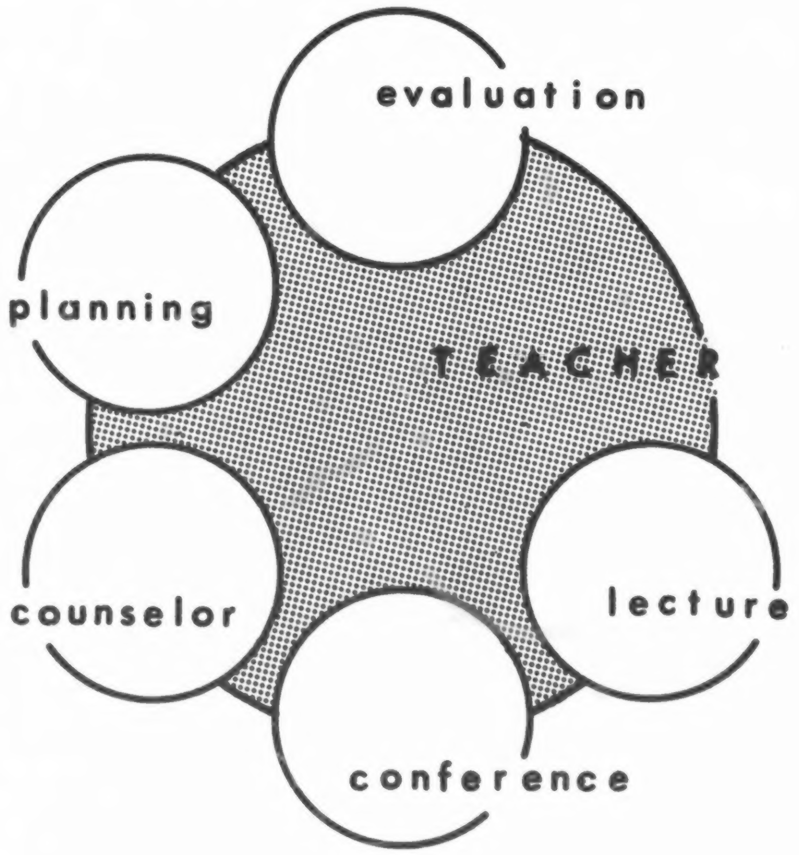
Resources, too, play a large part in his learning activities. The student will have to become familiar with resources, materials and media of all kinds since they will be an integral part of his everyday work.

The student will hopefully be better prepared for things to come; since he has been allowed to penetrate in depth those fields that most interest him, he will be well-founded in them. There may be opportunities for advanced placement in higher levels of education, too.

All in all, the learner has to adopt a whole new role. The adaptation may not be easy, and problems will be encountered all along the way.

The Teacher in the Nongraded School

Many have feared that shifting the burden of learning to the student will de-emphasize the role of the teacher. While his role will change drastically, it will become more emphasized if anything.



The teacher will give up his traditional role as lecturer, and as the encyclopedic source of all information. He becomes the seminar leader, the project director, guide, and father confessor. Instead of providing all the answers, his job will be to direct the learner to experiment, to investigate, to discuss, and to evaluate his findings.

Another role of the teacher that will take on an added importance will be his position as evaluator. With the emphasis on eval--uation shifting from interpreting results of mass testing to the subjective evaluation of performance based on individual standards, the teacher must be willing and able to discover how each student is "really" performing.

In order to allow each teacher to get to know each student, teacher cycling will probably become much more common, and the contact between student and teacher much more continuous and informal.

One demand made on the teacher in the nongraded school is that he be well-founded in the body of theory behind nongrading. If he doesn't understand the reasons why he is doing what he is, the results may be unhappy for all concerned.

With the time gained from less formal classes and (probably) more automation of the learning process, the teacher will be freed to do the things that he should; direct, experiment, and confer. Also, those students on the outmost "fringe" areas of ability (the very gifted and the very slow), should find more help coming from the teacher.

The Role of the Administrator

It is critical that the student-teacher relationship, so important to the operation of the nongraded school, must also be reflected in the teacher-administrator relationships.

In the past, the procedures used in the classroom were so well-known and so well-drilled into the teachers, this rapport was really unnecessary. In the nongraded school, both become experimentors in new methods and ideas. They must work together.

One advantage of the nongraded systems as far as the administrator is concerned is that many of his previous chores in the areas of scheduling, evaluation, and tracking student progress through school can be put into the hands of the teacher where they belong.

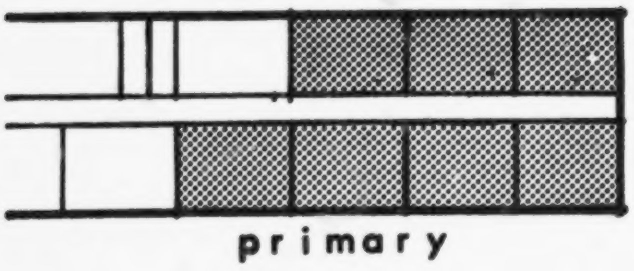
The administrator will also have to, unfortunately, be a salesman first class. He will find opposition to nongrading as soon as the word is mentioned. The nature of the opposition is often that of semantics, and these are the hardest battles to fight and win! We say, "unfortunately" because already the administrator is so overladen with public relations work that he may be forced to neglect the responsibilities of providing the best education in his schools.

Implications for Facilities in the Nongraded School

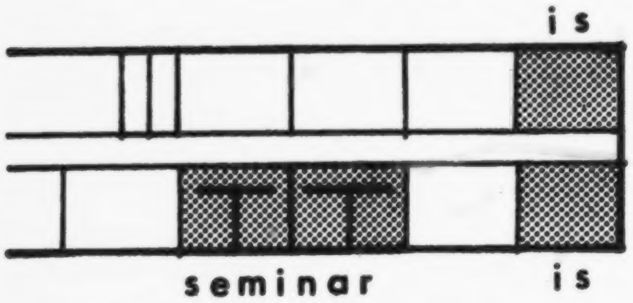
A. EXISTING FACILITIES

Existing Facilities may be utilized, particularly where the homeroom is to remain as the dominant social unit.

6



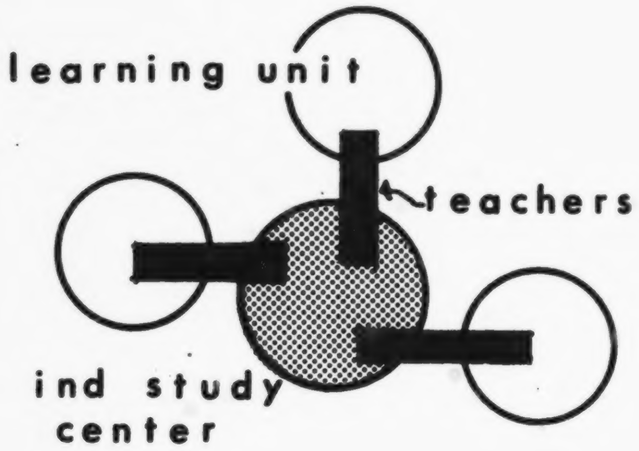
First grade, second grade and third grade classrooms may, for example, become a group of rooms simply designated as "Primary". The walls will undoubtedly act as barriers for real integration on the grades, but this can be put up with, if necessary.



Or, certain existing classrooms can be set aside as individual study areas. Facilities directly adjacent to libraries may be converted to carrel areas.

B. IMPORTANCE OF FACILITIES FOR INDEPENDENT STUDY AND WORK

A broad discussion of facilities for independent study was presented under the preceding topic and the reader is referred to pages 2-20 and following:



The important points to be considered include: TYPE OF FACILITY, GROUPING OF FACILITIES, and LOCATION OF FACILITIES. This last point in particular will be more important than was noted under individual student progress. The diagramed archetype, used as a design basis for the Blackwell Senior High School in Blackwell, Oklahoma, is a good example.

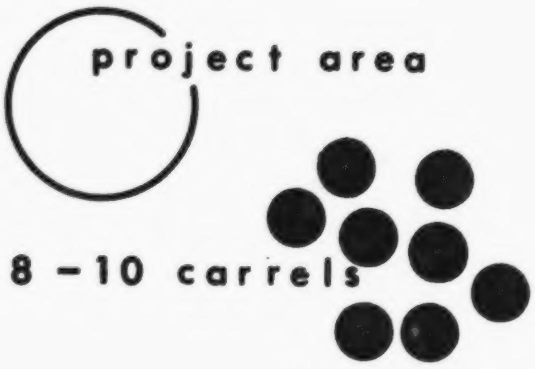
C. SMALL GROUP OR PROJECT AREAS

Small-group areas must be provided for discussion, for group use of media, and for group projects.

These areas should relate directly to carrels.

Further, for maximum

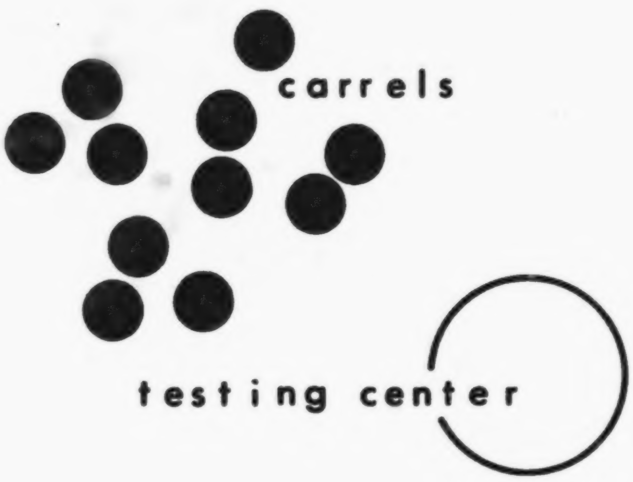
utilization, it would seem that these facilities should be open to the students at all times for formal and informal uses.



D. LARGE GROUP SPACES

Not many large-group spaces will be needed in the nongraded school. They will primarily be used for formal lectures, initial presentations of material, as assembly areas, and for special studies such as speech, music, and band.

E. SPACES FOR EVALUATION

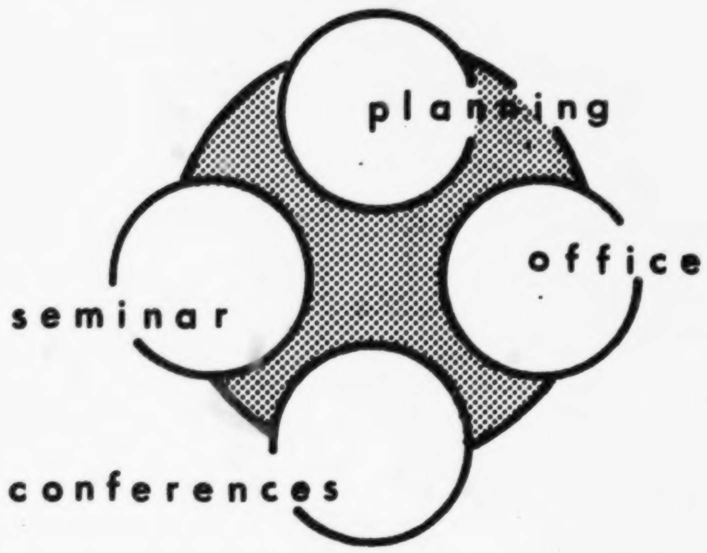


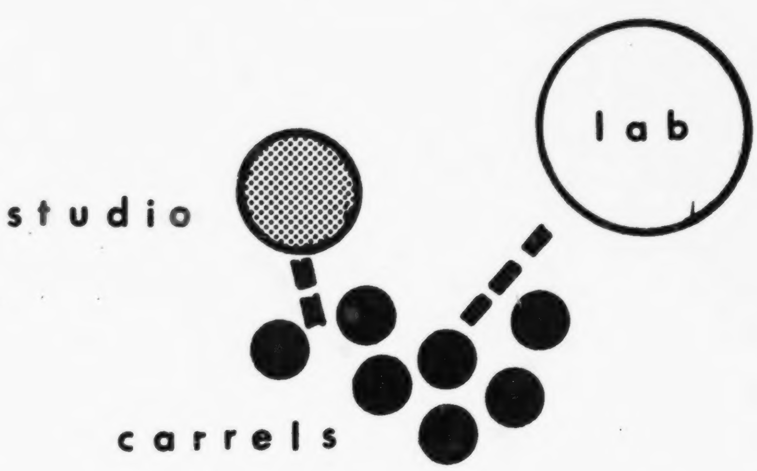
Small areas for student testing and evaluation will have to be provided, particularly if the school is planning to go in for automated testing equipment such as that discussed under "Programmed Instruction" in Section 7.

If evaluation is to take place entirely in teacher offices, or by the teaching device or machine, this type of space may be unnecessary.

F. SPACES FOR TEACHERS

With the elimination of the homeroom (if that is the case), there becomes a need to provide spaces for teachers. It is suggested that a great deal of thought be given these since the teacher will be asked to spend much of his time in them.





The studio as we will call it, must perform a number of uses for the teacher. (see diagram).

The studio is probably best located quite near individual study areas, and in direct relation to the space where the teacher may do most of his teaching or research (such as science labs, business machine rooms, etc.).

The Studios should also be grouped according to general disciplines or grade-levels to allow for staff interaction and planning.

Spaces for team planning and clerical assistants should be provided adjacent to teacher studios.

G. LIBRARY

We have mentioned that the resource center will take on a great importance in the nongraded school.

A general discussion of the role of the library is left to Section 7. However, it should be noted that non-differentiated-use carrels and project areas are probably required in conjunction with the library in the nongraded school. These home-bases may allow for use of library materials and media "on the spot" rather than requiring the student to check them out.

H. OTHER SPACES

Other spaces, as required, are necessary:

- Certain specialized areas, such as are found in most schools must be provided. These include spaces for physical education, industrial arts, fine arts, business practice, music, home economics, and so on.

- Student Commons areas to allow student interaction if it is not provided for by a homeroom.

- Spaces for media, production and distribution. (See Section 9).

- Importance of the guidance function and spaces to be provided for it.

- Importance of administrative and data-handling areas. (See Section 6).

ORGANIZING STAFF FOR EFFECTIVENESS

3

ORGANIZING THE STAFF

The Problem

In the light of new theories of learning and teaching, and the rising costs of education, greater utilization of a teacher's time and effort is being universally sought in our nation's schools. As the number of students in the schools increases, as the amount of knowledge to be imparted to these students increases, and as the demand for excellence required of our teachers increases, new ways must be found to deploy this valuable resource, the teacher.

In a nutshell, then, the problem is this: How can we provide the best instruction possible, to the most students, and at the least cost? One answer will be found in the field of aids and media (see Section 7); another will be introduced in this Section; reorganizing the staff for maximum effectiveness.

The Approaches

In this Section, two basic approaches to staff reorganization will be discussed; team teaching, and echelon organizations. Both present ways of better using the teacher, his time and his talents. Each, however, has different implications for presentation, scheduling, and staff deployment.

TEAM TEACHING AND PLANNING

Team Teaching and Team Planning

Team teaching in this report is broadly defined as the co-operative activity by two or more teachers in an effort to present better instruction. The teachers may be organized to cope with the increase in knowledge, to utilize individual talents, or to more effectively deal with the problems of individual students.

Implicit in team teaching is team planning. The team, however, can be extended to include any group of people planning toward a common educational objective. An example would be a group of teachers from different disciplines planning a sequence of courses. With the increasing use of aids and media, and the increasing need to co-ordinate instruction in different fields, team planning will become an indispensable element in our schools.

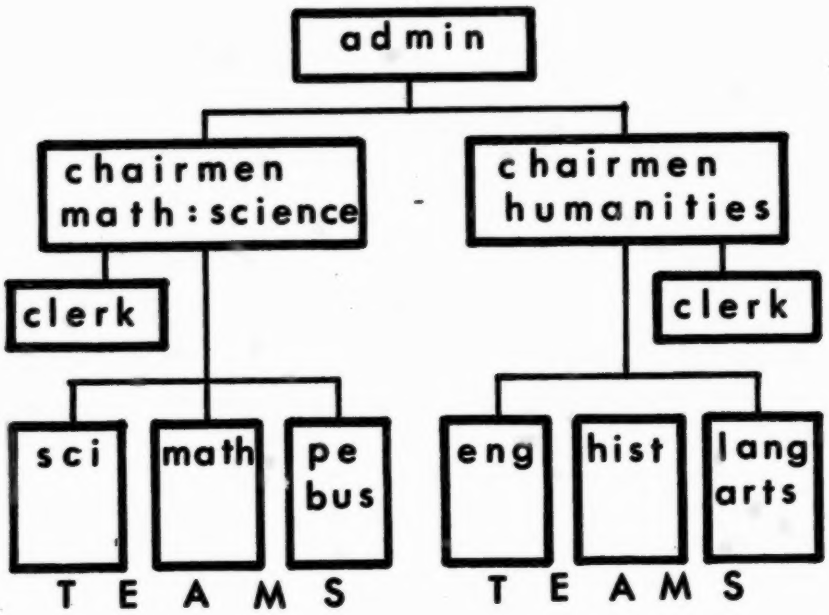
Objectives and Methods

In team teaching, the objectives of the team will determine its composition. When comprehensiveness is sought the classroom teacher might bring in teachers in related fields; when depth of material is needed, several specialists may be invited to speak or conduct seminars, projects, etc.

When the prime objective is the utilization of the various teachers' talents, classes may be divided into different sizes with one teacher lecturing to the large group and other teachers directing small group seminars. This situation of large-group and small-group instruction can also be used by a television studio teacher and the classroom teacher. The former would present bulk of the material while the latter could direct discussion and supervise projects following the TV presentation. Each instructor would be doing the type of teaching best suited to his talents and collectively the staff would present a wider background of experience than any one teacher could possibly do on his own.

An Example

An example of a total school organized by teams is Ridgewood High School in Norridge, Illinois.



In this case, team teaching was adopted because the administration realized that a teacher could not be all things to all students. In order to use teachers better, Ridgewood arranged its staff into closely integrated teams which freed the teachers from the rigid, unvarying repetition of similar classes all day long.

Effects on Scheduling

Time schedules must be made more flexible to accommodate creative planning by teams. The administration must realize that both the curriculum and the time schedule must be reorganized if team planning and teaching is to realize its full potential. The classroom teachers must have the freedom to make decisions concerning time and subject matter in the classroom as the need arises. Some examples of this flexible scheduling are discussed in Section 4, while methods of achieving it are discussed in Section 6.

Applications

Team teaching has been most fully developed at the secondary level with approximately one-fourth of the nation's high schools and junior high schools being involved, to some degree, in team teaching. However, with the stress of more specialized subject matter being introduced at the elementary level and the stress of more integrated material at the college level, team teaching will be more prevalent at these levels in the future.

The Role of the Teacher

For the conventional teacher who works in isolation from his colleagues, team planning and teaching may mean a drastic change. Team teaching requires co-operative planning, work, presentation and evaluation. Many teachers are not ready for this change, nor will some of them ever function well in a group. But for those who do make the change, there are the advantages of,

- Freedom from repetitious lecturing of the same material four and five times a day.
- Greater use of teacher talents; others can help fill in the weak spots.
- More co-ordination and integration of subject material presented by the teachers.
- More opportunities to experiment with new instructional methods, aids, media, etc.
- The younger teachers can learn the art of teaching from the older instructors by constant contact with them.

The Role of the Student

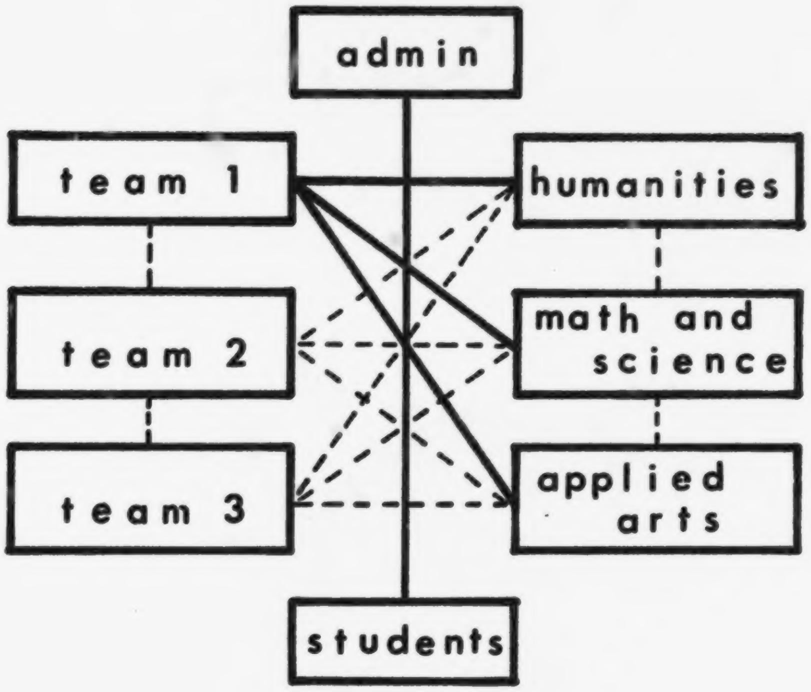
The student stands to gain from the team teaching approach. He gets the best that each teacher is capable of giving, he enjoys the flexibility and variety of learning experiences, and he may even be subjected to many almost-spectacular presentations that no one teacher, working on his own, could contrive. In Wayland High School, team teaching has been used as a means to develop independent study habits in students. This stress on independence and relevance of subject matter has had the interesting effect of reducing drop-out rates and discipline problems in many of the schools that have tried team teaching. Where students were once bored and antagonistic, they tend to be involved more in pursuing topics which are interesting and meaningful to them.

The Implications for Facilities

Historically, the first facilities for team planning and team teaching were no other than the conventional 24' x 32' classroom facilities where one, two or more teachers met to teach alternately. The need to divide students into a variety of group sizes to fully implement team teaching soon became evident, and the desire to expand or contract rooms led to the development of movable walls, folding partitions, etc. Along with the movable wall were developments of light and portable furniture and equipment to accommodate the flexible program.

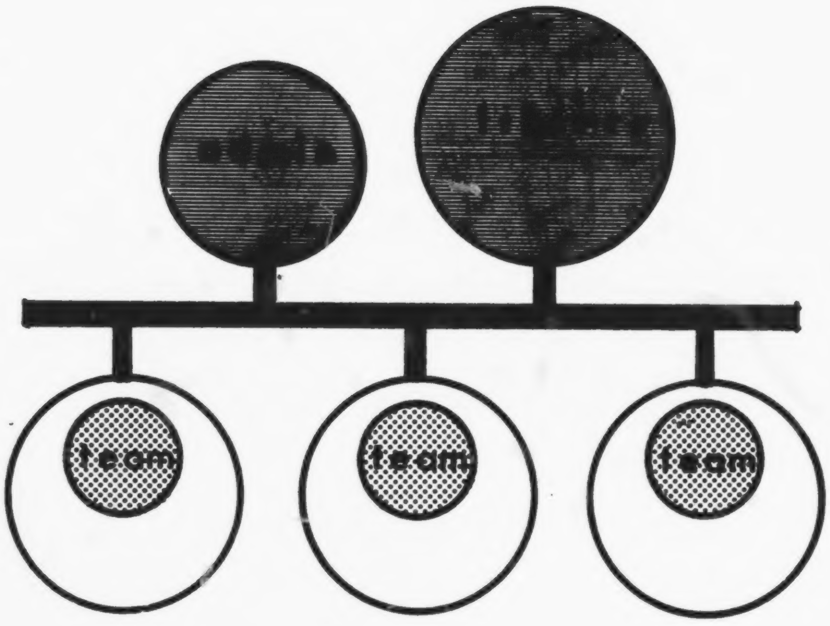
Another important focus became spaces for teachers. If teachers are to spend a great deal of time working and planning together, they must have spaces in which to accomplish these tasks in comfort and privacy.

Team teaching has been widely accepted enough, at this point, to exhibit some facilities which have been designed specifically for it (a claim, incidentally, that many of the new approaches cannot make).



An example of such a facility is Lamphere Senior High School in Madison Heights, Michigan. This school set up teams in which all members were equal in status. Team coordinators, at slightly higher compensation, were appointed to call and to supervise team meetings.

The basic team at Lamphere is made up of teachers in varying subject areas, i.e. one teacher in english, one in science, etc. The aim of this team is to integrate subject matter areas. One such team is set up for each grade.



Lamphere's physical plant, then, reflects this team approach, and groups each team in a cluster (a little school, see Section 5).

The facilities at Lamphere are an example of how the team program can provide a whole new basis on which to program and design school space. It is, of course, not the only answer; there are as many organizations of facilities as there are organizations of staff.

Certain general criteria for facilities can be made if the team teaching concept is one of the parts of the school's educational program:

- The classroom must be flexible to handle a varying number of students at various times.

- The program will likely imply the need for different kinds of areas to accommodate large groups, middle groups, small groups, and some individual study.

- The teacher must be provided with spaces for planning and working with others.

- Resources to implement the team approach (books, aids, media, equipment, etc.) should be provided through facilities easily accessible to the teacher spaces.

- Areas may have to be provided for data-handling equipment to implement the more complicated schedule which is usually a part of team teaching plans. (see Section 6).

ECHELON ORGANIZATIONS

The Echelons

The organization of staff to match specific duties with specific personnel often creates a system of staff echelons and a hierarchy of staff responsibility. The primary function of this concept is the allocation of human resources -- it is the old story of paying more capable people a higher salary and giving them increased responsibility, leaving some of the routine labor to less qualified and less salaried staff members.

The Trump Plan

In Images of the Future in 1959, Dr. J. Lloyd Trump introduced his now-famous plan for an effective staff echelon organization. Through this organization in the secondary school, Dr. Trump felt that he had come up with a solution of the teacher shortage without including the necessity for increased expenditure.

The staff in the Trump Plan includes the following types of personnel:

- Professional Teachers : teacher specialists
  general teachers
- Instructional Aids
- Clerks
- General Aids
- Community Consultants
- Staff Specialists

The duties and responsibilities of each of these echelons can be briefly summarized:

- PROFESSIONAL TEACHERS direct learning activities; plan methods and materials of instruction; teach concepts and appreciations; counsel and consult; assist with student activities, provide specialized services for which they are competent and interested. These professionals may be given the opportunity to work year-round if they desire.

- INSTRUCTIONAL ASSISTANTS (10-20 hours/week). They perform specific aspects of teaching below the professional level, but above the clerks; read and evaluate some themes, reports, etc.; confer with students about their progress and provide teachers with reports; serve as laboratory assistants; supervise specific out-of-school projects; assist with student activities.

- CLERKS (40 hours/week). They type and duplicate materials; check materials and prepare reports; grade objective tests; check and distribute supplies; take attendance, etc.

- GENERAL AIDES (10-20 hours/week). They control and supervise students on school grounds, in cafeterias, in corridors, auditorium, etc. and at extra-class activities.

- COMMUNITY CONSULTANTS. They are used when desired or needed to lecture, consult, make tapes, slides or other aids. These are generally volunteers from the community, but may be paid a small fee for their services.

- STAFF SPECIALISTS. These are full-time personnel who may serve several schools in such areas as guidance, health, reading, aid to slow children, and to supplement work of the professional teachers.

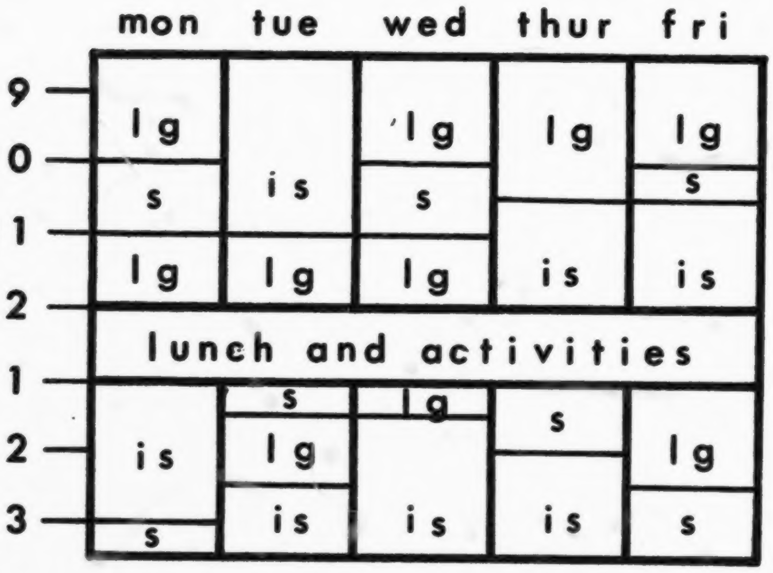
Dr. Trump further suggests that the teaching functions be divided between the teacher specialist and the general teacher; the former instructing large-groups, evaluating, providing guidance, with the latter taking on the responsibility of small group instruction.

The Teacher's Time

According to a number of studies, today's average classroom teacher works about 48 hours a week. In the future, the teacher specialist may only average 18 hours a week with the student groups, nine and one-half hours spent in large-group teaching and the remaining eight-and-a-half hours spent with small groups. The number of hours spent with students by the general teacher will not be significantly different from today, but the efforts along non-instructional lines (attendance, milk money, etc.) will be considerably reduced.

Organizing the Time

In addition to the reorganization of duties of personnel, Dr. Trump also suggested changes in the time schedule of the school utilizing the echelon approach to instruction.



Instead of the six or more periods in the day with the same schedule repeated each day of the week, the school of the future will schedule class groups on an average of only 18 hours a week instead of the present 30. The student's time schedule will approximate: 40% in large group instruction; 40% in individual study; and 20% in seminars.

The Net Results of the Trump Plan

The net result of the Trump Plan of echelon organization will include the saving of several top-notch teachers, more planning time for the teachers, improved utilization of facilities, better uses of teacher talents, and a pay scale which can give teachers an incentive. All of these advantages can be achieved at relatively little increase in cost. A Trump comparison of personnel needed in a given situation includes,

- PRESENT : 16 full-time classroom teachers to provide instruction to 400.

- FUTURE : to provide instruction for the same 400:

  5 Teacher Specialists
  5 General Teachers
  5 Full-time Instructional Aides
  2-1/2 Full-time Clerks
  1 General Aide

Other side advantages of the Trump plan include the idea of being able to introduce new teachers at lower echelons, allowing them the opportunity to be gradually introduced to the profession under the care of professionals.

The Facilities

The echelon organizations, such as the Trump plan, often center around large-group, seminar, and individual forms of instruction. Facilities outlines for these were given in Sections 1 and 2.

The reorganization of teachers with more time to plan, to research and to discuss, implies a need to greatly improve spaces for teachers. From the large room with several desks against the wall, the teachers' spaces must move in the direction of accommodating spaces for

- Meeting and planning privately and in groups.

- Planning and preparing lessons.

- Developing instructional materials.

The environment must be conducive to working productively during the hours not spent in the classroom.

ORGANIZING TIME FOR EFFECTIVENESS

4

WHY IS ORGANIZING TIME IMPORTANT?

Different Times To Do Different Tasks

Educational psychologists and researchers have shown that different tasks in different fields will take different times to complete:

- The optimum length for student interest and retention may fun from twenty minutes to well over an hour depending on such factors as, the topic, its relevance to the learner, the nature of the discipline (certain "skills" such as shorthand may reduce the time during which interest can be maintained to 20 minutes), and the environment or surroundings.

- A seminar could, within limits, be an open-ended thing. Some discussions "never get off the ground" and should end early. Others may strike a responsive note and can last much longer.

- Laboratory, research, and project-type activities are often most effective if carried out all at once rather than in 50-minute chunks.

- A conference with a teacher may last only a few minutes.

- School assemblies, guest lectures and so on may take varying amounts of time.

If this is the case, why do schools stick with restrictive, pre-determined, equal-length class periods?

What About Independent Study?

If one of the school's educational objectives is to increase the emphasis on individual study and projects, how is this concept handled and equated with an equal-length period set-up?

How long does it take to write a theme? How long does it take to research a fact? How long does it take to perform a chemical analysis? How long does it take to discuss an issue?

The Active Role of the Learner

If the concept of the active role of the learner is accepted as valid by the school, why should it not allow the learner more autonomy in planning his own activities?

How valid is this autonomy at the various levels of education?

An Eight-Hour Day?

If the student is required to do more research, to perform more individual projects, and even to be taught on his own (such as by programmed instruction), why must the school plant, and hence the student's resource center, be closed down everyday promptly at 3:30 p.m.?

Why shouldn't the schools allow this kind of use over the weekends, too?

Utilizing Resources

If we are investing millions of dollars each year in the building of school facilities, why do we insist on using them for only 180 days a year?

If modern schools invest in expensive administrative and instructional equipment, as is the current trend, does it make sense to utilize this equipment for only 180 days a year?

Many teachers, who make up another expensive resource, feel that they would rather teach on a full-time basis rather than only 180 days a year.

What implications does the inclusion of continuing education and other extension aspects of the school program have on the utilization of school facilities? Why do we limit our schools to k-thru-12, and then for only 180 days a year?

The Need to Educate A Growing Population

With the current spiralling increases in population, isn't it becomming simply out of the question to let facilities stand idle for any significant period of time?

Isn't this particularly true in areas of higher education where great percentages of students who are qualified for this education must be turned away from the schools of their choice?

THE 'TRADITIONAL' PERIOD

What Assumptions Underlie the Traditional Organization of the Time Spent in School?

Almost all schools today use a time-period arrangement of some kind. It may range from the relatively free and informal set-up found in the elementary school, ("O.K., children, let's get out our science workbooks now."), to the inflexible 50-minute periods which begin and end with the all-powerful program bell.

This time-period concept seems to rely on the following assumptions:

- That it takes a similar amount of time to do any number of different tasks.
- That this time can be determined, and that it is about 50 minutes. The student can then condense or expand his efficiency as needed.
- That it takes the same amount of time for every student in the class to do the same task.
- That every subject needs to be taught five days a week.

While many institutions of higher learning have moved away from many of these assumptions (particularly the last), most schools at lower levels are far behind.

Our Approach

The approach that this Section will take in considering the time spent in education will be to first consider ways of reorganizing the hours spent in school, and secondly, to examine the possibilities of extending the school day, week, or year.

EXTENDED TIME PERIODS

Longer Time Blocks

Some schools have attacked the problem of organizing time by extending the length of the traditional time period to sixty or eighty minutes. The schedule at Nova High School in Fort Lauderdale, for example, uses six 65-minute periods each day, (one is for optional electives). The teacher then schedules the use of the 65 minutes any way he desires, ranging from lecture to independent work.

Advantages and Disadvantages

The obvious advantage of the extended period is that some of the problems mentioned can be solved without creating administrative chaos. A certain amount of flexibility within the traditional class period system is achieved.

The unfortunate aspect of the extended period is that it really doesn't go very far in solving the problems; while a variety of learning activities can take place in the long time block, long projects, open-end discussions, and conferences must still adhere to the 65-minute mark! One also wonders if the motivation for independent work that is stuffed into the end of a long period is up to that of other proposals (particularly that of Dr. Edwin Read, discussed later in this Section).

There is also some advantage in letting students move into a different kind of facility or environment to do different tasks. In a conference conducted by Rensselaer's School of Architecture (soon to be published for the Office of Education under the title Three Meetings in May), Dr. Read makes quite a point that this change in environment when changing learning activities is most beneficial to motivation.

Another Consideration

A common limitation on using extended periods is that, if the school day is to remain about as long as it is now, the number of periods in the day must be reduced. This is possible with the dropping of study halls, and possibly not teaching each course all five days every week. Another solution is in using trimester and quarter systems (extended school years) which is what is done at Nova. Three trimesters of five courses, for example, are equivalent to two, seven-course terms.

Roles of Student and Teacher

Simply extending the length of school periods should make few differences concerning the roles of student and teacher. The teacher, however, will be concerned with the problems of motivating students for longer periods of time. If an accompanying extension of the school day, week, or year is involved, these effects will be taken up later in this Section.

The Implications for Facilities

This concept can be applied easily in existing school buildings and plants. The scheduling and utilization of the facilities will become more important, though, since facilities not used will be standing idle for longer periods of time.

The school may become involved in trying to design facilities that will allow for even the slightest environmental change when the student moves from one learning activity to another in the same period. This may involve movable room dividers and so on, to change the scale or the "feeling" of the space.

MODULAR TIME PERIODS

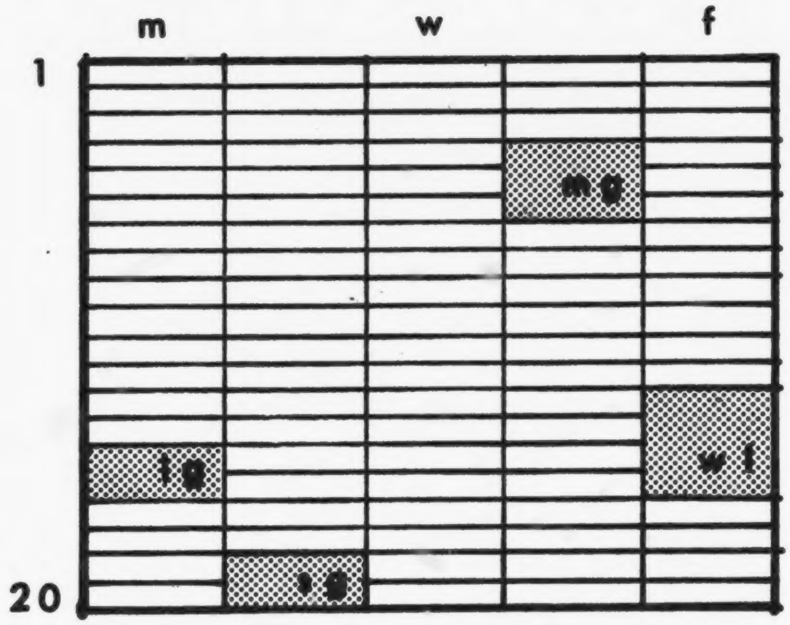
The Modular Time Period

Modular time periods attempt to solve the time problem not by eliminating periods but by creating more of them! Instead of a 7- or 8-period day, the school may have 15 or 20 time periods or modules. Classes, instead of lasting for one period and always one period, may be from one to five or six modules long. Periods of any length can be put together simply by adding modules. These time modules usually run from 20 to 30 minutes.

Setting Up the Modular Schedule

When the administrator begins to set up the modular schedule, he first surveys each of the courses offered, asking teachers to provide a list of learning activities and time requirements.

This allows the teacher to restructure the course in terms of time devisions actually needed; no longer must the course be fitted within the predetermined, equal-length periods.



The time requirements for a course in eighth-grade english (converted to 20-minute modules) may look like this:

- Large-group: 40 minutes each week = 2 modules.
- Middle-group: 60 minutes each week = 3 modules.
- Small-group: 40 minutes each week = 2 modules.
- Writing lab: 80 minutes each week = 4 modules.

The schedule shown in the diagram on the preceding page gives the english course in shaded tones as it might actually appear on an eighth-grader's schedule sheet.

Solving the Problems

Even though the modular time period is really only breaking down the length of more conventional periods, the fact that they are additive solves many of the problems we have noted.

First, different times are alotted to do different tasks. A class may last for only one module, or it may go to five, six or more. A conference may last only twenty minutes, a lab two hours or more. Coupled with individual-centered curricula, long blocks of time may be set aside for independent study. Within certain practical limits, the schedule can contain as many modules as possible and desired.

Certain blocks of periods can be set aside for assemblies, activities, and so on. The lunch period may last for several modules in the middle of the day, thus allowing students to trickle in to the cafeteria and alleviating the noontime rush. The left-over modules allow free time for independent study or discussion.

The Scheduling Cycle

One of the important implications of modular time periods is the changing of the traditional scheduling cycle. This cycle has always been one day long; that is, Tuesdays were set up exactly like Mondays, and Wednesdays like Tuesdays. The use of the modular periods generally increases the length of the cycle to a week. Mondays may have little resemblence to Tuesdays, but all Mondays are essentially alike. The colleges have been operating on a one week cycle for years.

Applications at Different Levels

Modular time scheduling is applied principally at secondary and higher levels of education since the day's schedule in the elementary classroom has always been quite informal. Team planning and

and teaching, variation in group sizes, and independent study plans may soon require this type of scheduling at these lower levels, too.

Adaptability of the Modular Time Period to Certain Organizations

Modular periods work particularly well in conjunction with certain organizational patterns. One such pattern is the variation in group sizes; since teachers can list the time requirements for each course (see above), the chances are that they will take this opportunity to set up the various group sizes needed for effective presentation. Modular periods also "allow" this variation in grouping since schedules are flexible. Combining the modular period with the group size variation produces another effect: the higher utilization of facilities (assuming, of course, that the school has the correct types of facilities to house the various group sizes).

Another organizational pattern which modular periods may help effect is individual-centered types of curricula. The fact that scheduling is flexible, and that a great deal of independent study time can be built into the program makes these time periods particularly attractive in this area.

Limitations

Limitations on adopting modular time scheduling have mostly to do with the administrative problems created; by both increasing the number of periods in the day, and the length of the scheduling cycle, the process of scheduling takes on tremendous proportions which will overwhelm even the most competent administrator. One possibility is to allow the computer to handle the problem (see Section 6); and this has been the case in the programs that have been adopted on any scale so far.

The Teacher's Role

The teacher, no longer tied to the equal-length period, will have wider latitude in planning learning activities. The flexibility of the system also provides for changes from term to term if new time requirements are discovered.

Ideally, modular periods economize on the time spent in class, and the teacher should have leftover time for planning, conferences, etc.

The Facilities Implied

While the sizes and types of facilities will vary with the actual instructional programs used, certain points may be made.

First, these modular systems generally imply the use of large-, middle-, and small-group instruction, and spaces will be required for each. The tightly-drawn modular schedule should, as we have mentioned, provide high utilization rates for these facilities.

An important part of modular programs which are designed to leave a lot of time for independent work are student facilities to support this kind of activity. These facilities are discussed in detail under "Individual Student Progress" in Section 2.

Circulation areas, within fire code limitations of course, may be able to become more informal and corridors less cavernous, since large rushes of students will not have to be accommodated each time the bell rings.

Spaces to handle scheduling functions (as discussed in Section 6) may have to be provided.

STUDENT—PLANNED PERIODS

The Student as Planner

The student-planned period, a concept originally tied with continuous-progress curricula, essentially allows the student to determine the exact scheduling of his time within a general framework set up by the school. Although the example presented here is that of Dr. Edwin Read in his Continuous Progress Plan, and is geared exclusively to nongraded curricula, one can see the implications for use within other patterns, too.

		M	Tu
1	math	studio	review test
2	eng	visual presentation	skills lab
3	lang	lab	report
4	art	↑	project
5	sci	lab test	↓
6	cit ed	resource	conf.
7	gym	swim	track

In student-planned scheduling, a master schedule (shown in shaded tone) is drawn up within conventional time periods, although the specific beginning and ending times of these periods are not precisely set. Within the outline schedule, each week the student "fills in the blanks" as it were, detailing his activities for each day in each course. He uses as "givens" any laboratory work, pre-scheduled demonstrations, teacher conferences, project evaluations and so on. He finds that he may want to switch some time blocks to get longer periods for projects.

By allowing the student the chance to switch time periods around, whole afternoons or even days may be scheduled for one large project. The possibilities for flexible scheduling are endless.

The Advantages

The advantages are two-fold; first, the student gains a great deal of autonomy and flexibility in scheduling his learning activities, and secondly, the administrator is only faced with minimal scheduling since most of the details are worked out by the students and teachers.

The Student's Role

The prime advantage of this system as far as the student is concerned is the degree of autonomy that he enjoys. Many educators, including Read, feel that this autonomy is a desirable situation (particularly at upper levels) and that students can derive motivation, responsibility, and self-discipline through it.

The Teacher's Role

Probably the greatest impact here is the time left to the teacher. Because of the "looseness" of the student schedules, the teacher should have little trouble finding times for small-group discussion, conferences with students, team planning, and so forth. The actual amount of left-over time will vary, of course, with the type of instruction provided; individual-centered approaches, for instance, almost always provide the teacher with much free time no matter what time organization is used.

Implications for Facilities

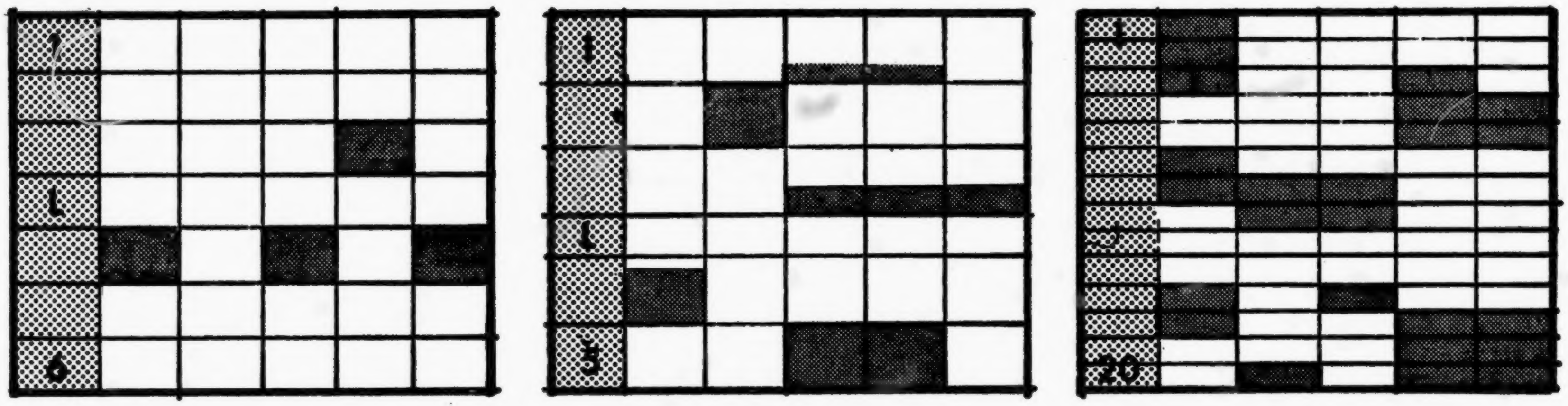
The most pressing need will be spaces for individual learning if this time organization is adopted as part of individual-centered approaches (see Section 2). If it is not, the demands of the particular educational program will control the facilities needed.

Teacher spaces, such as the studios discussed in Section 2, will be important since a great deal of time may be spent in them. These should be located close to student learning spaces.

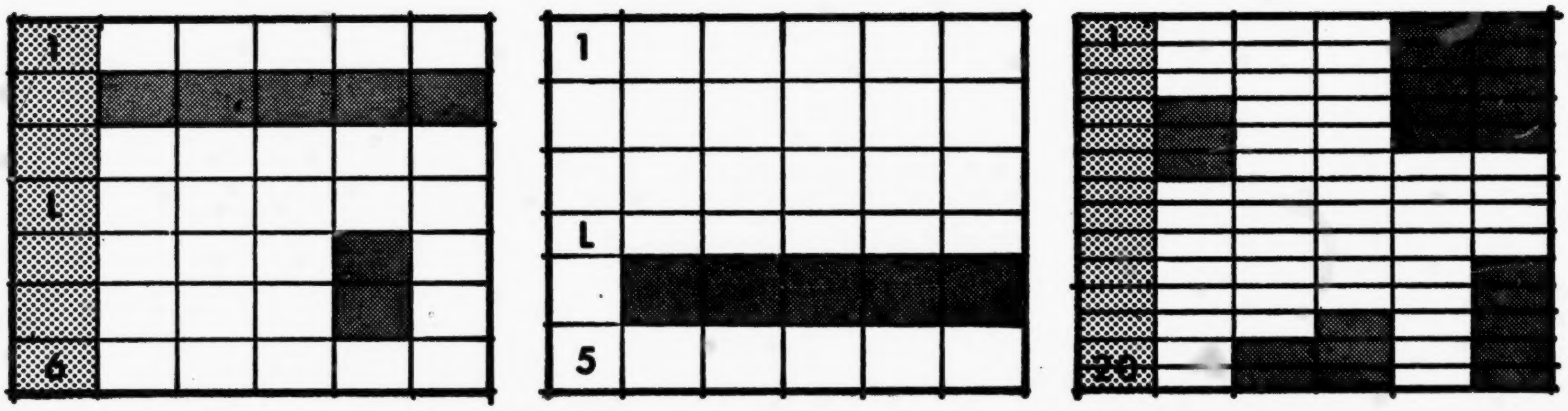
Finally, the need for large circulation spaces should diminish somewhat.

SOME GENERAL COMPARISONS OF THE MAIN TIME ORGANIZATIONS NOTED:

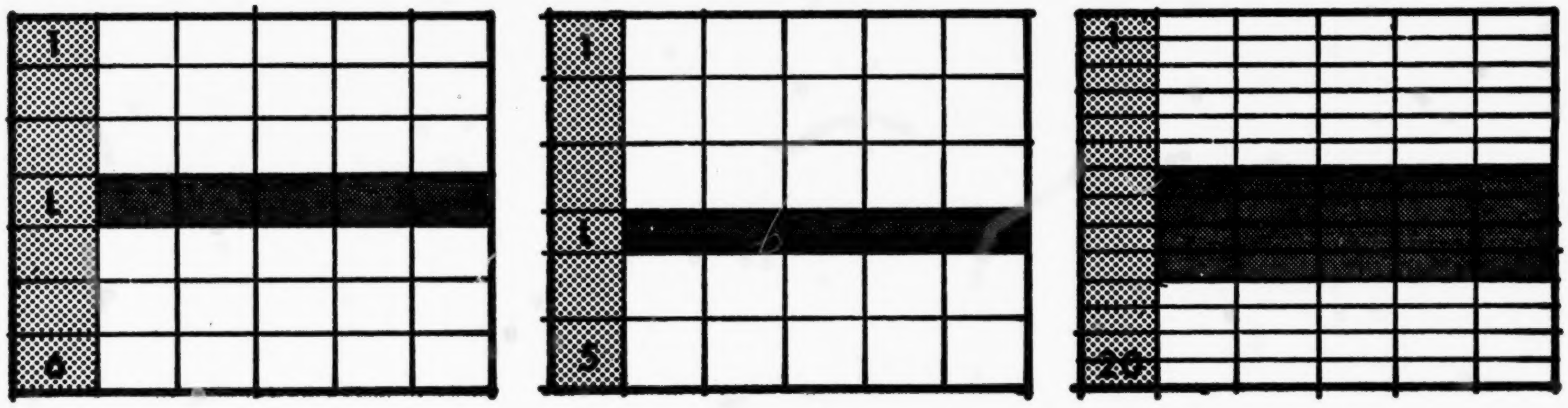
conventional extended modular



A STUDENT INDEPENDENT STUDY



B TEACHER UNSCHEDULED TIME



C LUNCHTIME FLEXIBILITY

EXTENDED SCHOOL DAY AND WEEK

The Many Reasons

There are a host of reasons why a school might consider extending its school day or school week. Extending the day, incidentally, does not necessarily imply that the hours spent in instruction must be lengthened. What is meant is that many of the resources that the school is fortunate to possess (staff, materials, facilities) should not be closed down promptly at 3:30 in the afternoon. Likewise, some of the resources should be made available to students over weekends. The reasons:

- Students can remain in a position to be in close contact with teachers and advisers for longer periods of time.
- When emphasis is placed on independent work, some schools have lengthened the school day and week in order to provide for greater utilization of materials and resources.
- This argument further contends that the use of these resources can nearly replace the need for traditional homework.
- Students who are highly gifted should be allowed to make full use of the school, and to conduct after-hours projects on the premises if they wish to. Some schools have done this by giving students keys to labs, etc.
- There may be a need to actually lengthen the amount of time spent in instructing students. Nova High School, for example, offers elective courses during an additional period in the morning.

- Continuing education, extension, and "work-learn" programs may demand extended school day or week.

- Many schools would like to sponsor special programs and seminars on a voluntary basis and may have to extend the day or week to accommodate them in its schedule.

This concept has been applied for a good many years at higher levels of education; colleges have always insisted on leaving their research, experiment, and resource facilities open for long after-hours uses.

Limitations

The limitations are ones of economics, as usual. Lengthening the time that a plant remains open to students will increase the need for control, and the need to provide for a "care-taker" type of staff to operate the buildings after-hours.

There is likely to be some screaming from the "3:30 teacher," too. Most dedicated teachers, however, find that after-school hours are just as much a part of their working day anyhow, and that the longer hours would mean little change.

The student, too, will have to shake the 9-to-3 concept of schooling in order to gain the most benefit from the program.

The administrator may be faced with more work in scheduling the use of his resources and facilities in the longer hours.

The Facilities

The school will have to be set up for maximum accessibility to all with minimum care-taker personnel and control points, a big task. Student sense of ownership gained from the greater accessibility may ease the situation greatly. Finally, teacher facilities must be designed for long-hours use and should be convenient, quiet, and comfortable.

EXTENDED SCHOOL YEAR

The Reasons for Extending the School Year

There are many motives for extending the length of the school year, currently about 180 days; some of these reasons are primarily educational, and others are primarily economic:

- The extended school year is advocated by the proponents of individual-centered curricula on the theory that the layoff each year is harmful to continuity.

- The trimester and quarters plans that are being tried by many colleges and some high schools allow fewer courses--and greater concentration--each term, while not requiring the total number of courses taken to change.

- Under the extended year systems, even more courses than the average may be completed in one year, allowing the ambitious student the opportunity to graduate from school a few months earlier than is required. Most schools provide many qualifications on this idea, though, to avoid criticism that says that they are simply trying to "grind out" students faster.

- Extending the school year tends to, within vacation limits, maximize the use of resources and the school plant.

- With the rising costs of education, it may become imperative to maximize the use of staff, materials, resources by utilizing them year-round. Further, enrichment, "work-learn," and continuing education plans may force the school to remain open all year.

Some Qualifications

It would seem that this idea can be applied at all levels of education as long as certain limitations are taken into account:

- Just how many months a year a child can effectively devote to education is a factor. This problem is fundamental, and has a great deal to do with sustaining motivation, an area which still needs much study. According to The Year-Round Campus Catches On, however, psychologists assure use that normal youngsters can take this in stride.
- Vacations must be arranged for instructors and administrators. If the school operates on a graded basis, there will be time needed to make-out schedules, etc. Some colleges on extended year plans have worked out research and sabbatical rotations for their faculties.
- The need to provide some time off for students to allow vacations with their parents must be met.
- Maintenance and repairs to (particularly older) buildings and grounds are often best accomplished when workers are uninhibited by the presence of students and teachers.
- Certain dates, such as entry dates into college from high school, have to be co-ordinated in both programs if they deviate from more conventional school year organizations.
- It must be recognized that certain students must work to attain costly higher education, and must take terms off or participate in a "work-learn" situation in order to finance it.

The Student's Role

It has been shown that these programs are generally quite popular with students, particularly when year-round attendance is voluntary. The popularity of summer sessions at all levels attests to this statement. One adjustment that must be made, though, is the abandoning of the notion that the summer vacation is the one goal of the entire school year. While vacations are necessary, too often they are overemphasized. Finally, year-round schooling should enhance, rather than diminish, the importance of extracurricular activities since the student's attention will be focused on the school for most of the year.

The Teacher's Role

The teacher, too, will have to become used to the idea of being a full-time worker, a concept not unwelcome to many a devoted teacher. It must be recognized, though, that teachers do need longer vacations than many workers; this is particularly true at higher levels where the need to do research and written work is evident.

The Implications for Facilities

If the school is designed to serve as a year-round plant, certain points should be noted:

- Materials and construction should be durable enough to stand the use all year around. This will undoubtedly mean an increase in the initial cost of the school building (an unwelcome idea in this era of the defeated bond issue!). The increased utilization of resources, and the decreased maintenance costs resulting from using better materials, should help to justify this increased cost.

- Year-round climate control possibilities must not be overlooked. Air conditioning will probably be needed if summer occupancies are expected. Again the utilization figures should help balance this expense.

- There must be additional emphasis on physical and psychological "comfort" in the school building, both for the student and for the teacher. The school must be a pleasant place in which to work and to learn.

ORGANIZING PLANT FOR EFFECTIVENESS

5

THE PROBLEMS IN ORGANIZING THE PLANT

New Understandings Demand an Increased Emphasis on Plant Organization

Educational psychologists are making great advances toward further understanding the basics of learning theory and are making suggestions concerning curriculum, staff, and facilities.

Too often these days, the plant is designed on the basis of a nineteenth century prototype, and remains nearly oblivious to the philosophies of education being implemented inside of the building. The crucial need now is to reflect the learning theory in the organization of the plant.

Likewise, research into motivation demands that emphasis be placed on the "climate" surrounding the learning process; both social and physical environments must be considered.

New Educative Patterns Must be Reflected in Plant Organization

Many of the new educative patterns and organizations discussed in earlier sections require that new plant organizations be considered:

- Organizing students in large groups and in seminars for instruction implies a different social structure within the school than if students are organized in groups of one for independent work.
- If administration, to be effective in the schools emphasizing the importance of the individual, must "humanize" and decentralize, the plant organization must reflect this change.

- New instructional patterns based on the use of often-expensive technical media must be reflected in the organization of the plant.

Size, and its Effect on the Student

As the number of students tied up in the education process grows by leaps and bounds, so does the psychologist's concern about size and its effect on the individual. It becomes most economical to build and operate the large school; on the other hand, many feel that the small school has social advantages for the individual. The problem is that the small school is simply too expensive to operate, and the big school is just too big! How can we begin to balance these two factors?

The Expanding Role of the School

As the actual role that the school plays in our lives increases--the eighth-grade educated man has given way to the college graduate--and the number of people going back to school increases, the plant must become more versatile to meet these needs.

A detailed explanation of these factors is presented in Section 8.

Last, but not least: Economy, and the Need to Utilize

As the costs of education rise and emphasis is placed on economy and further utilization of facilities, administrators and architects must look more toward improving the use and quality of existing facilities, or toward providing efficient new facilities for the organizations.

THE CHANGING ROLE OF THE PLANT

The Plant Defined

As we are planning to look at it, the plant can be defined as a place or a group of places where people, facilities, aids and media are organized into a system that will provide an effective learning situation.

The Plant Has Undergone Relatively Little Change In Over a Century

In 1847, a four story schoolhouse was built in Tyler Street, Boston. This edifice, known as the Quincy School and erected for $60,000, contained four floors of classrooms, one large enough to seat all 660 students in assembly hall fashion. It also featured such revolutionary devices as chairs and desks bolted to the floor! While the Quincy School served well the educational philosophy of the time, it unfortunately became a prototype for decades to come. Even when the advances in educational theory did come, the plant was still based on the Quincy School. Indeed, in many districts, it still is.

When we consider education today as the total involvement of the student in the learning situation, it becomes impossible to adhere to even the most time-honored of prototypes. We should deal with plants and organizations that not only consider but actually complement many of the new ideas.

Also, in the light of the speed of advances in the fields of learning psychology, the plant must be flexible enough to accommodate whole new ways of doing things.

A New Consideration

One of the great limiting factors on plant organization in the past has been distance; the size of a building, or of a campus, was always limited by the requirement of personal contact between student and teacher, or student and resource materials. In this modern age of science, electronics, and technology, the distance is beginning to become much less important as a limiting factor. No longer is constant face-to-face contact an essential of certain types of learning. Television and other communication techniques allow the plant to assume new proportions and new boundaries.

How Big do We Get?

It would seem that the disappearance of the need for constant face-to-face contact, and the growing pressures for economy would force bigger and bigger plants. However, the administrator must consider the following factors before he commits himself to a large-scale plant:

- OBJECTIVES OF PLANT ORGANIZATION: What ages will be taught and what are their requirements, both educative and social? What types of courses will be taught? What student maturities can be counted on?

- SOCIAL ASPECTS: What correlations can be drawn between plant size and social growth? How much student interaction is necessary?

- STAFF & ADMINISTRATIVE ORGANIZATIONS: How available are good instructors? How will they be organized for effective instruction? How much flexibility is allowed in scheduling students and teachers?

- A BREAKING POINT: Is there a point where the school just becomes too big to operate efficiently? Are economies in utilization of resources offset by paperwork and the demands of bureaucratic organization?

The New Organizations

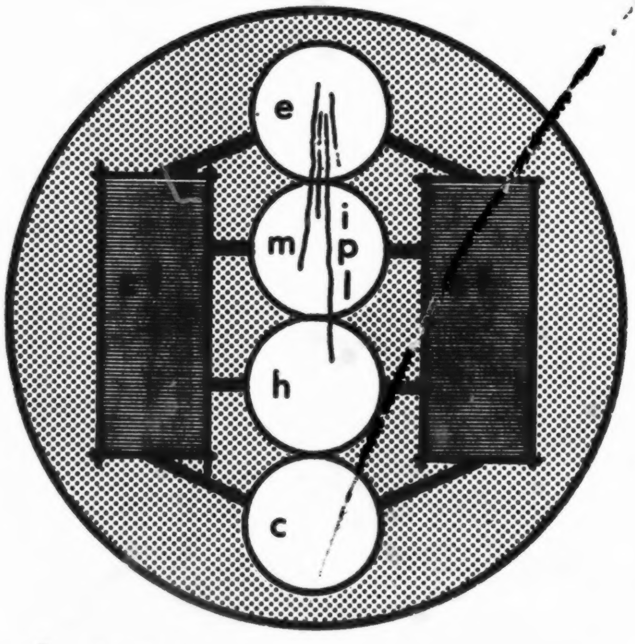
On the basis of trends in educational psychology, and as approaches to solving the problem outlined at the beginning of this Section, new plant organizations are evolving. EDUCATIONAL PARKS seek to combine, and SCHOOLS-WITHIN-SCHOOLS seek to separate the elements of the plant. SCHOOLS-AWAY-FROM-SCHOOLS further seek to separate out these elements.

EDUCATIONAL PARKS

Why Educational Parks?

An educational park, by way of definition, is a totally centralized plant organized for all levels of education, (pre-school and kindergarten through college), using common central facilities. It is an organization conceived as an answer to a number of crucial problems facing education today. The educational park:

- Provides for more efficient use of resources by eliminating duplication in some facilities (kitchen, athletic, auditorium), by reducing cost-to-student ratios, and by providing for greater utilization of staff.
- Makes possible a more effective use of often expensive media such as television, local origination and teaching machines.
- Provides a system for the efficient use of an individual-centered continuous-progress curriculum if that is the school's goal, since there are no problems of transferring students from level to level.
- Provides a system which can help solve the problems of segregation and integration.



KEY

cf : central facilities
ipl : individual progress levels
e : elementary
m : middle
h : high
c : college

Some Limitations

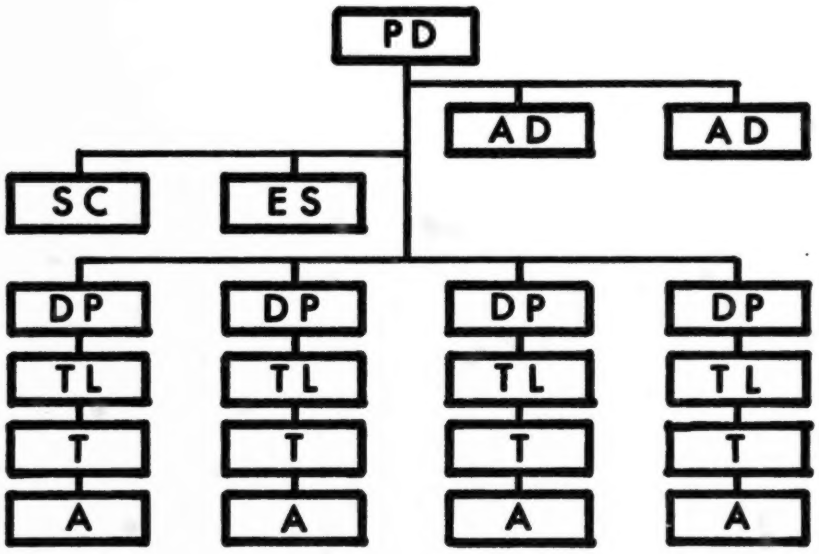
While the educational park concept answers many crucial problems, it is not without faults. These faults must be understood and resolved if a community accepts an educational park as its plant organization:

- Transportation of large numbers of students to and from the plant is likely to be expensive (particularly if the park is designed to replace neighborhood schools), and creates problems of safety, large investments in buses, and bus scheduling.
- Scheduling of teachers, students and media must be carefully examined.
- The sheer bigness of the plant may create social problems, for there is little doubt that the smaller school has more to offer in terms of these non-educational advantages.
- An individual could simply become lost in a plant designed on the grand scale if great care is not taken to soften the "scale" of the facilities, and the learning in general.

Possible Patterns of Organization

Many of the organizational patterns, both vertical and horizontal, may be applied to the concept of the educational park. The park is, as we have noted, particularly suitable to the use of individual-centered curricula, varied group sizes, various staff organizations, and large-scale use of media for instruction.

Having a large plant does raise one particular implication, however: the need for a cohesive and effective organization of staff. Often a whole new heirarchy of staff must be established to make the plant operate at par. The organization, a possibility of which is given here, resembles that of a university with many different schools and curricula,



PD	Plant Director, or President
AD	Administrative Directors
SC	School Chairmen
ES	Educational specialists such as media men, psychologists, guidance, corrective personnel, etc.
DP	Department Chairmen
TL	Team Leaders
T	Teachers
A	Assistants

Further emphasis and discussion is devoted to staff organization methods in Section 3.

The Teacher in the Educational Park

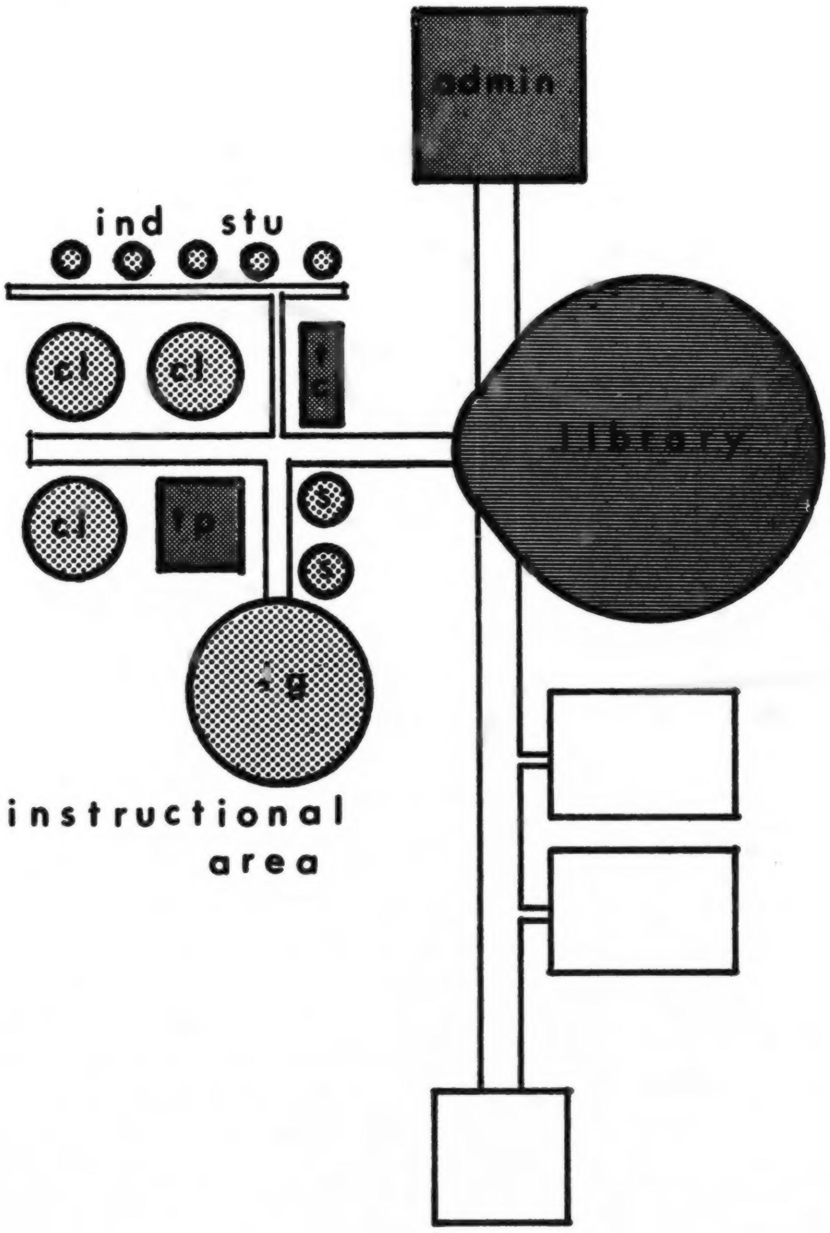
The teacher must be able to adapt to the overall organization, both in terms of its size and in terms of the increased availability of resources and facilities for his use. Despite bigness, the teacher must be ever cognizant of his role as an active part and critic of staff and educational policy within the school.

The Student in the Educational Park

The student must react according to the specific organization patterns used in the educational park. One possible implication, however, is that since there are so many different students of so many different ages on the campus of the park, students can be combined in pyramidal groups (student led, a few from each level) for instruction, or the older students may provide tutoring for the younger.

Implications for Facilities

In any plant organization, the building elements and their related facilities are most instrumental in making the education process work. This is especially true in educational parks which may accommodate a variety of patterns. While the facilities required may be of what we consider "common" in schools, it must be remembered that the park's "stock-in-trade" is in its ability to combine and utilize all types of facilities:

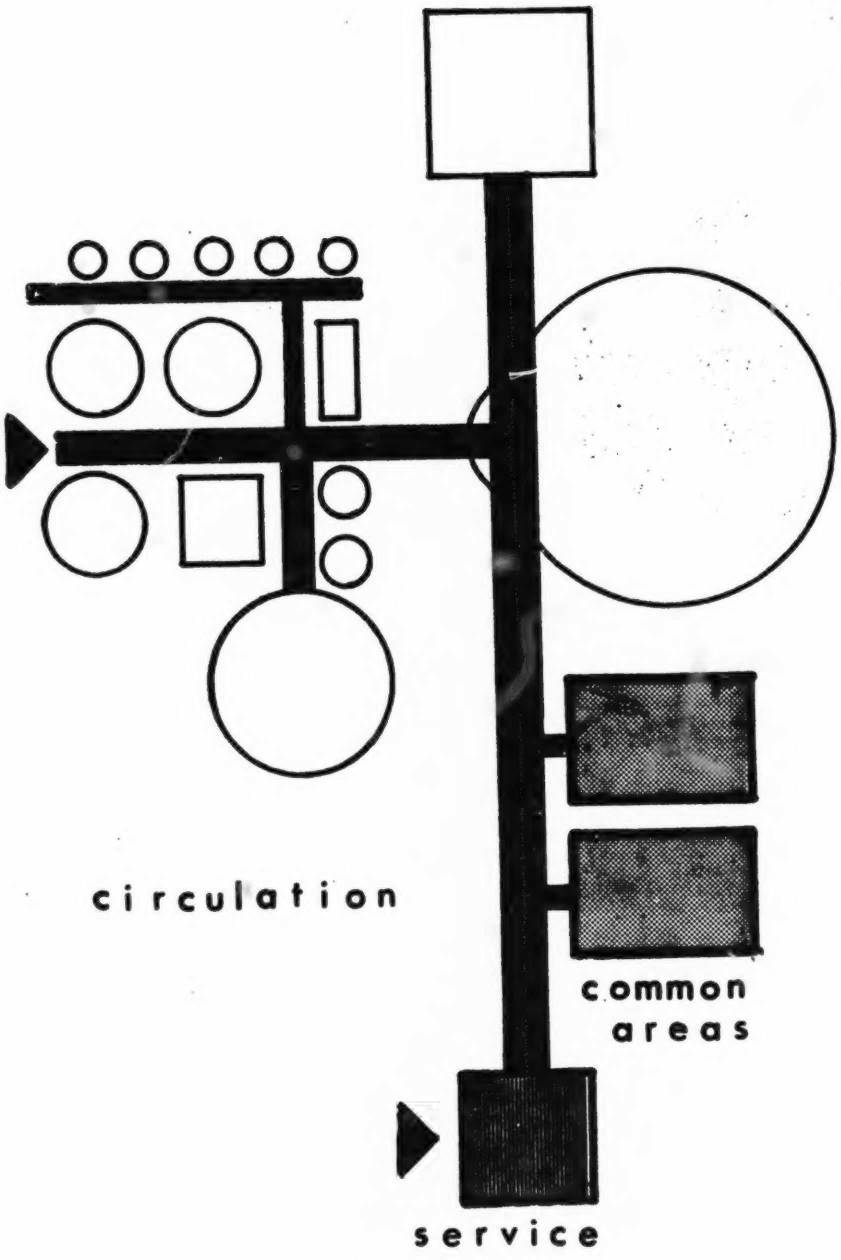


INSTRUCTIONAL AREAS: the bigness of the park will allow the provision of many different kinds of facilities (large-group spaces, smaller rooms, individual study areas) depending on the exact needs of the program. The point is that, if facilities are correctly programmed, there will be a minimum of waste and idle-use time. Various teacher areas should be provided for consultation, previewing, etc.

LIBRARY AND RESOURCE AREAS: these are best centralized, and the educational park serves them well. The problems are to make these areas central enough, as far as the school's circulation pattern is concerned, to make them readily usable by students and teachers.

ADMINISTRATION AREAS: a large-scale plant will require a good deal of space for administrative functions; housing of staff and personnel, records, possibly even data-handling (see Section 6 for details of the latter).

SERVICE AREAS: these will include kitchen, dining, and mechanical services. The kitchen seems to function best as a centralized element for reasons of economy of preparation and service. Dining facilities would most likely be decentralized in the student instructional areas. A comprehensive analysis of mechanical costs, both for installation and operation, should be made to determine whether central or diverse systems are to be used.



COMMON AREAS: such facilities for physical education, music, industrial arts and home economics must be planned to allow for use by all levels. An auditorium should be designed for maximum utilization by all levels of students. Large-group instruction spaces may be dividable by partitions for use as smaller spaces for meetings, small productions, etc.

CIRCULATION: the circulation of teachers, students, equipment and vehicular transportation must be organized into an efficient system for speed and safety. Students should be able to move between the different progress levels and the common areas. Service vehicles and busses should not interfere with pedestrian circulation. In all, there should be a clear hierarchy of circulation throughout the complex.

SCHOOLS–WITHIN–SCHOOLS

The Purpose of This Plant Organization

The purpose of the schools-within-schools concept is to devise a method which will divide the large educational complex into smaller units which are either discipline-oriented or scale-oriented. A brief description of each of these methods will be given before general implications are noted.

The "Discipline-Oriented" School . .

The purpose of the discipline-oriented school-within-a-school is to,

- Organize a subject discipline into a more effective pattern of instructional sequence. For example, the "school" of science will be organized with an integrated curriculum including not just one science course after another, but courses which cover all fields in an overlapping and continuous way.
- Organize the discipline staff in terms of an autonomous unit with a department head and usually planning and teaching teams.

. . Its Advantages

The advantages of the discipline-oriented school are those of providing a more meaningful curriculum, of providing for specialized fields of study (where this is desirable), of providing a basis for more individualized programs within a discipline, of providing more useful and effective student evaluation, and of breaking down the large plant into a series of smaller units. They are particularly useful on the high school level where a degree of specialization may be more desirable.

. . Its Limitations

The most significant criticism of this type of arrangement is that which is so often hurled at colleges with their tightly-designed departmentalization and over-specialization: there is simply too much specializing to provide any real co-ordination between all parts of the curriculum.

The "Little School" Concept . .

The purpose of the "little school" form of a school-within-a-school is to,

- Establish an acceptable social learning unit which can provide more social integration and interaction; more chance for participation in government, or extra-curricular activities, or athletics; and more opportunity for individual attention.
- Organize the staff into an effective unit which is cohesive and autonomous. Teachers may remain with the student group throughout the years spent in school, allowing them to get to know the children well enough to accurately evaluate the educative process.
- Decentralize the administration, using the little school as the primary administrative and guidance unit. This way, the administrator, too, can become more familiar with each of the personalities in the school.
- Provide flexibility within the school to change instructional procedures based on the needs of the smaller group. Teachers should find it easier to detect flaws in materials and presentation, and should be more easily able to correct them.

. . And Its Limitations

To be totally effective, teachers and students really should be kept together through the years spent in the little school.

Educational Patterns Employed

A variety of educational patterns, new and old, can be employed with the framework of a school-within-a-school:

- Any type of vertical structure (grading, multigrading, nongrading), may be employed.
- Multiclass teaching may be used since there are smaller groups to work with, and this kind of instruction lends itself well to discipline-sequential learning.
- Team teaching and echelon organizations may be used. Teachers will probably be cycled (staying with the students for longer than the conventional year) in the little school concept.

The Role of the Teacher

Since one of the prime reasons for forming these smaller schools is for more effective staff organization and more effective contact between student and teacher, the teacher must live up to this magnified role.

One of the main lay-criticisms of teacher cycling in the little school concept is that if a child gets a poor and ineffective teacher, he is "stuck" with him. Unfortunately, the criticism is quite pertinent to the issue, and each teacher must make every effort to provide effective learning experiences.

Since contact between teacher and student is generally more casual and informal, the teacher must become aware of new evaluative techniques; techniques that may be much closer to the mark than the bi-weekly examination! These are discussed in programs advocating individual-centering of the curriculum.

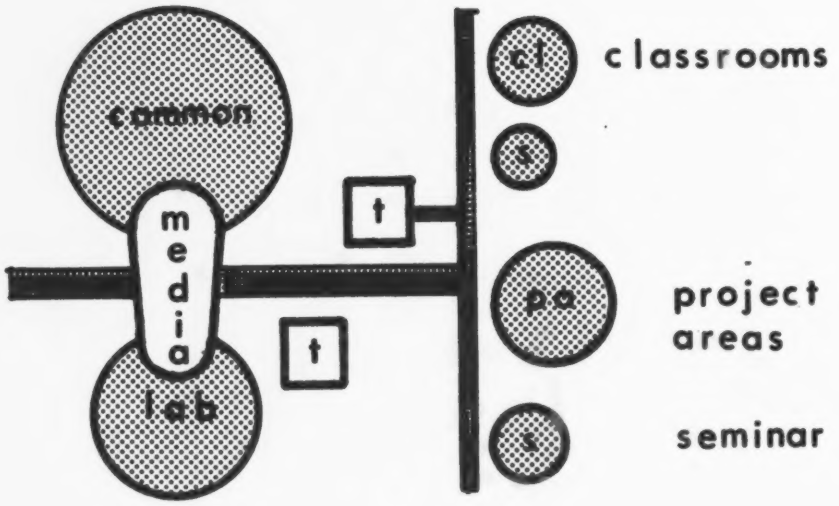
The teacher will also have to become more creative in planning and instructing, particularly in the little school concept where he may be cycled with the students.

Implications for Facilities

It should be mentioned that the various schools-within-schools plans can be incorporated as new plant organizations within existing facilities; many schools have tried this and been quite successful. As is always the case, however, the new plant organizations work best when the facilities are specifically designed to support them.

Discipline-Oriented School-Within-a-School

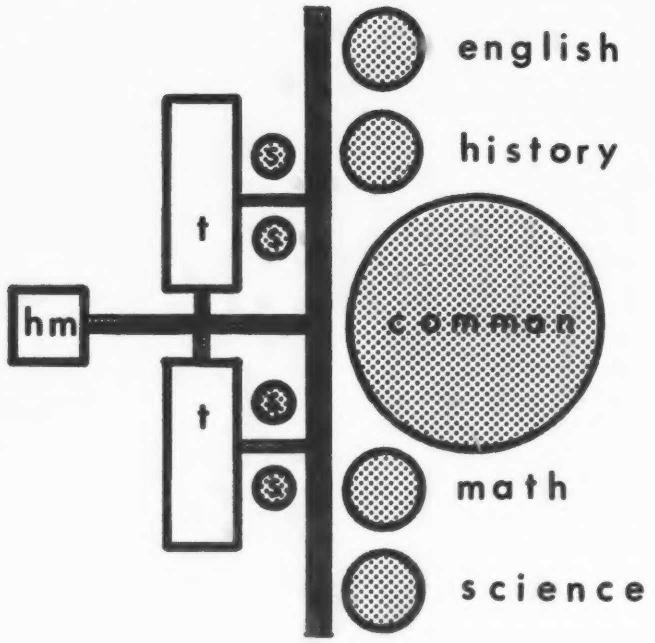
The discipline-oriented school may be organized in clusters, based on the subjects taught.



Each school may have special classrooms as determined by the subjects taught. Laboratories, special media facilities, seminar rooms, and common group instruction rooms for multi-class teaching may be furnished. Teachers will have to have spaces for planning, storing materials, and consulting with students.

Little Schools

Usually the little school is built as a series of "houses" grouping around central facilities.



The little school will have facilities for all types of discipline instruction. Classrooms for all subjects and the special related fields will be planned for. A common facility serves as dining room, meeting room or multi-class teaching room. Teachers will have special offices for similar purposes as the discipline-oriented school. The house master will need facilities to direct staff and students.

Both types of schools-within-schools will require special common facilities. Areas for physical education, music, industrial arts, central administration, etc. will have to be provided as needed. Clusters may be spread apart or integrated into one form.

SCHOOLS AWAY-FROM-SCHOOLS

A New Kind of Plant

The schools-away-from-schools concept may be defined as a plant organization which extends the reach of the school into areas which may be apart from traditional instructional areas. Instruction may be presented by technical aids and media, rather than in a face-to-face way from teacher to student. The effect of this can be a greater range of coverage, which could bring about solutions to the problems of extending education and offering better education.

What Makes it Feasible?

Recent new ideas and philosophies have contributed many new and creative innovations in instruction. These innovations have provided a great impetus for the schools-away-from-schools:

- LARGE-GROUP INSTRUCTION has shown that the personal face-to-face relationship of teacher to student is not always essential to learn.

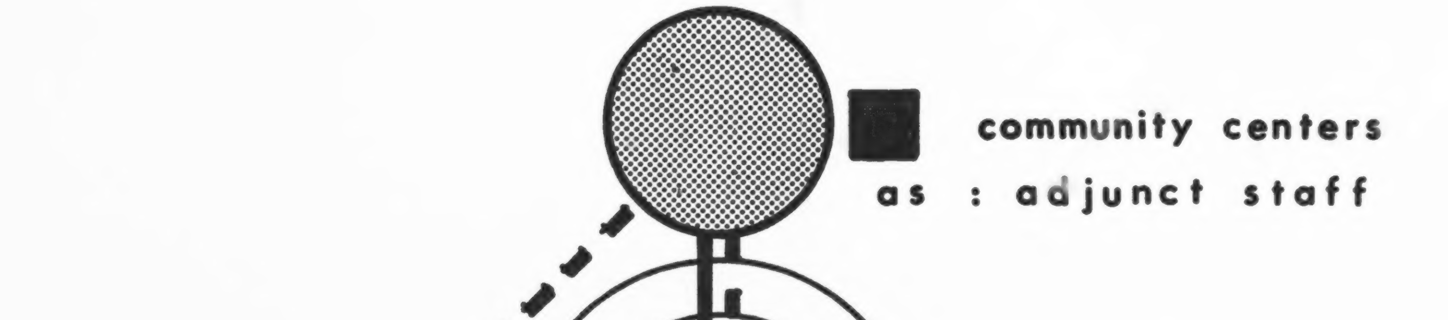
- INDIVIDUAL STUDY METHODS have noted that, by using study carrels (or learning labs, as we call them), a student can effectively learn material presented to him. At first, the learning lab was installed within the school building, but it has been found that it is just as readily adaptable to other locations.

The Plant Components: The "Transmitting Area"

The new plant organization consists of two main elements which are established in given areas: the "transmitting area" and the "response area". The transmitting area contains some sort of administrative and instructional staff which evolves a curriculum, plans and presents the instruction in the most effective form, and acts to evaluate their effectiveness. The transmitting area can be found in the origination center, in the library, or in any place where planning and presenting material takes place.

The "response area"

The second component is the "response area", a place where students can receive instruction by various devices such as television, programmed instruction, information retrieval, and other audio-visual devices through which he can learn effectively. These areas can be located in many places depending upon aspects of scale (how many to serve), the purpose of the material, and the age level of receivers.


community centers
as : adjunct staff
individual homes
dorms and student areas
factories & businesses

RESPONSE AREAS

In Dormitories and Student Areas

One type of response area can be in the college dormitory or other student areas. Here the purpose of transmitted instruction may be to,

- Present new material prior to classtime to enable more effective classroom discussion.
- To reinforce the facts of classroom learning.
- To encourage dormitory discussion (discussion groups led by older students or resident faculty may be used to support the lectures).
- To help break down the barriers between the so-called "academic" and "living" areas.
- To give additional help to those in need, and extra instruction to those who elect to go further or delve deeper.

The methods that might be used to implement this type of instruction in dorms and student areas might include,

- Television use for large-group instruction.
- Programmed teaching devices.
- Dial systems for information retrieval.
- Miniaturizations for labs-in-the-dorm.

In Community Centers

With the increased demand for higher education by adults, it is necessary that the school extend its resources to these new students. It is often difficult for an adult to travel to the school. Institutions, therefore, may establish adjunct facilities in community centers to carry instruction to the students. These community facilities may include public schools, libraries, social and cultural centers, etc. Instruction may be presented by,

- Closed-circuit or Broadcast video tapes and live lectures.
- Programmed materials.
- A Course syllabus requiring various out-of-class assignments.
- Visits to the centers by instructors and lecturers. Resident directors or advisors may direct students to new resources, etc.
- Use of miniaturized teaching aids.

In Factories and Businesses

The effects of the shorter work week will give workers more time to pursue various forms of recreation or education. It may be the responsibility of employers to provide their staff with this education for purposes of job retraining, specialized training or continuing education (see Section 8). The results may be to,

- Improve employer-employee relations.
- Help curb unemployment problems.
- Provide special courses to staff and personnel, thereby increasing efficiency, etc.

An industry or business may establish a tie with a near-by college and be electronically connected to its resources. Instruction may then be brought into these places in much the same way as was discussed in the preceding paragraph. Another approach could be the use of business staff to assist in the instruction.

In Individual Homes

New technology is making it possible to bring education into the individual home. It is being achieved today mainly through the use of television and standard textbooks. This type of communication will be able to reach many new learners who desire either college credit or enrichment. These new learners may be,

- Housewives and mothers who desire to work when relieved of child-caring duties.
- Handicapped individuals who desire expanded learning resources.
- Professional people who desire refresher courses or enrichment.
- Gifted students who are not challenged by regular school work.

The use of new aids and media can increase the self-instructional resources. The development of the 8mm cartridge projector and the video tape recorder will bring new resources into the home. It may be feasible for a family to own a form of teaching machine or small computer and receive special programs from local origination areas. The adoption of various proficiency exams will allow in-the-home students to gain credit for this type of study. The major limitation of this in-the-home school is the lack of two-way communication. Here again, the community center discussion group can act as a sounding board for ideas, projects.

The Teacher's Role

The teacher will have to be able to organize all available resources into a syllabus to be used in these schools-away-from-schools. If teaching a complete course, he must provide an effective instructional sequence, and some means for evaluating students and instruction. A teacher will have to accept the loss of direct communication with his students; he may be teaching several thousand at one time, and cannot hope to be able to come into personal contact with each and every one of them.

The Student's Role

The individual role of the student will become more pronounced. The student will have the sole responsibility for his education. He may not have to meet attendance requirements of hand-in assignments, but he must actively participate in the learning process by consulting with others, performing learning tasks, searching for additional resources, etc.

The Facilities

The facilities for the transmitting area imply a certain amount of co-operative development of instructional resources. University production centers or special library and origination centers will store, prepare, and transmit all instructional resources. Facilities may include:

- Television taping and origination areas
- Information retrieval and storage areas
- Audio and visual tape libraries with storage and distribution areas
- Programmed instruction areas if this instruction is of electronic nature

The specific facilities for the response area will, of course, vary with the type of programs that use the school-away-from-school. One main characteristic, however, will be privacy. Those who now gain in-the-home instruction from television, for example, find that lack of privacy and interference from other sources to be the worst problem.

IMPROVING THE ADMINISTRATIVE PROCESS

6

THE PROBLEMS

The Size and Scope of Education Today

Coupled with the phenomenal expansion of our population is an increase in the proportion of it associated in some way with education.

In 1964, to point this up, some 55,000,000 Americans were engaged full-time in the nation's educational enterprise as students, as teachers, and as administrators or staff members.

Then, too, technological obsolescence and social desires for continuing education (see Section 8) practically insure that the need for education does not cease for the individual with a high school or college degree.

In the middle of this growing web is the school administrator. He is faced with the prospect of coming up with new approaches, new methods, new efficiencies -- or going under, drowned in a morass of paper and routine.

The Impact of the New Approaches

The recognition of many weak points in our traditional patterns of education has brought on many innovations. Almost all of these have one point in common; they complicate the administrative process, often to the point of frustration. Some examples:

- Individual centered curricula: if each student is to progress at his own rate, how is a schedule made up? how are results and performance evaluated? how are routine tasks such as materials distribution taken care of?

- Variation in group sizes: if different groups of various sizes are set up, how is the student-teacher-course-room-time overlap and conflict resolved? how is space utilized to the maximum?

- Team teaching: if team teaching is used, how are teachers' schedules planned to avoid conflicts and to allow time to plan together?

- Educational Parks: if different levels of the educational process are placed on the same campus, how are the pieces co-ordinated? how is the information relayed? how are students transferred from one part to another?

- New Media: how are the various media and equipment scheduled to avoid conflicts in use? how are miniaturizations,tapes,and projectors catalogued and checked out?

School "Routine"

Many of the once routine clerical processes in the school are being reviewed in the light of the recent investigations in education.

The evaluative role of the school, for instance, can no longer deal with such simple questions as "Does this child pass or fail?" It must somehow explore the complex patterns in each learner's make-up and evaluate their effects.

The "library function" once consisting of a librarian and a drawer of cards, has grown very rapidly. Now it may cost twice as much to catalog a book as it does to buy it! With the increasing emphasis on the role of the library, steps must be taken to make it more efficient to operate.

How can routine functions, like attendance, payroll, inventory, reports, examination grading, statistical analyses and the like, be made easier and more economical to handle?

AN INTRODUCTION

While there are many obvious ways of improving the administrative process, such as hiring more competent personnel, and shifting work loads to clerical personnel, these may only begin to scratch the surface as far as solving the problems is concerned. The bright light in the picture seems to be the computer.

Why Computers?

When the problems encountered in science and engineering became too complex and too time consuming for an individual to solve readily, the computer was developed. This machine was meant to serve man and not to replace him -- there was always the human element behind it in the form of the programmer.

And so with education. As the problems of improving the administrative process have multiplied, educators have looked to computers for help in solving them.

Why? A computer can be fed the same basic information that, say, a human administrator can digest when he makes up the schedule: students, courses, teacher preferences, and times. The difference is that the machine will greatly reduce the time it takes to juggle these factors in their endless permutations and combinations, and to produce a workable schedule.

COMPUTER-BASED SCHEDULING

How does it work?

A current emphasis lies in better organizing the time spent in school. (see Section 4) One of the most significant results of this emphasis has been the breakdown of the traditional school period as the primary scheduling unit.

If this concept is accepted as valid, it creates important headaches when the administrator is faced with the task of juggling students, teachers, courses, rooms and times that have become hopelessly complicated by modular scheduling, or by independent study, or by variation in group sizes.

A way out of this problem has been to turn to the computer for help. This useful device which has been used for a number of years to assign students to sections and so on, has been perfected to grind out complete master schedules of students, teachers, rooms, times, and courses. GASP, such a system, is fully described in a recent EFL publication entitled "School Scheduling by Computer". From certain givens or parameters (such as: listing of instructors, courses preferred, rooms and capacities or special uses, students and student requests, time patterns desired, maximum students per class, free periods desired, maximum teacher loads, etc.) a full master schedule can be obtained. All of this given information is punched into cards, and combined in the computer with the program, which may consist of over 50,000 separate instructions. Of course, there will be conflicts, and the given information must be rechecked for errors either in theory, or in key-punching. From five to twenty-five runs through the computer may be needed to complete the schedule, but this remains a great improvement on forcing the administrator to do all this work himself.

Expense

In the EFL report mentioned above, it is estimated that about two man-hours of conventional scheduler's time may be devoted per student in making up the schedule. The cost of the computer operation, on the other hand, may be less than half of the cost of the administrator's time. Individual situations, of course, determine final costs.

Applications

The use of computers may be part of any educational program at any level. The prime issue is one of economics, which is discussed below.

The computer permits new organizations and new methods that simply were not feasible in times gone by. It allows the administration and the faculty a broader latitude of organizational patterns in which to work.

Organizations and Limitations

The limitations on the use of the computer are more than likely to determine the schemes of organization. Since the actual data-processing equipment is very expensive, administrators will be spending a great deal of time in deciding just how they are going to utilize it:

- They may decide to install a data-handling center in the school where the operations take place. This may be economical where there is a gigantic scheduling problem (as in a very large and diversified school or in a continuous-progress school) and where the computer can perform other functions as well.

- They may decide to co-operatively establish a computer center with other schools or districts. In this case, key-punch, preparation and distribution facilities may be located in the individual schools.

- They may decide to take their problems to a regional computer center that specializes in developing scheduling for schools. Stanford University provides such a center which is used in its own research and has developed a number of schedules for west coast schools. Further implications are discussed in Section 9.

In any case, the items of expense (machinery, personnel and facilities) will probably exert more limitations on the use of the computer than any others. If computers that are already being used to perform other tasks can be programmed to handle administrative chores, costs can be brought down considerably.

The Role of the Student

The greatest impact of computer-based scheduling on the student will be a general loosening up of time organization in the school. The psychological barriers provided by the 50-minute time period and by the periodic "marching" on to the next classroom can be lifted and replaced by a more relaxed and mobile feeling.

Impact on the Teacher

The teacher will undoubtedly become more computer-oriented: he will have to become specifically educated in the specific requirements of these machines.

The computer should be able to lessen the paperwork load on the teacher by being able to automatically print out the many different kinds of lists needed by him.

Effects on the Administrator

The use of the computer for scheduling, and for other uses as mentioned later in this section, may mean a shifting in the role of the administrator. He may actually gain some of the time to do the tasks his job implies -- those of the educational leader in the community. He may devote his time and attention more to the problems of organizing his school for effective learning and relinquish many of the more routine chores to the computer.

MECHANIZING LIBRARY OPERATIONS

The Growth of the Library

As the size and the importance of the library grows, so does the clerical labor necessary to keep these complex facilities functioning. It has been estimated that the average library may spend over twice the purchase price of a book in simply processing its entrance into the library. The costs, of course, continue each time the book is checked out.

At a large college library, there may be over twenty persons employed simply to check in new serials and periodicals in order to avoid duplication and to insure proper filing. This is a job that requires relatively little talent but must be done if the library is not to end up drowning in a sea of magazines!

Of course, the new functions of the library, the addition of all kinds of instructional aids and media, (discussed in detail in Section 7), likewise add to the problems of library function and control.

The forthcoming answer to many of these problems appears to be the computer. It seems to have an unsurmountable appetite for routine work -- and the library is a good customer!

Relation to the Major Problems Facing the Library

ACQUISITIONS: The selection, authorization, purchase, payment, cataloging, preparation and shelving of books and materials may be speeded along by setting up a punch card for each new title which is then,

+ Matched to existing cards in the library

to make sure it is not there already.
- Sorted by dealer for ordering purposes.
- Sorted by account number for bookkeeping.
- Sorted by subject, title, and author for shelving and cataloging.
- Retained in the permanent files as record.

SERIALS CONTROL: The process of keeping tabs on all publications arriving at the library can be mechanized by a print-out system by which all duplicates are automatically discarded. Others are referred to proper places.

CIRCULATION CONTROL: Using a punch card for each title and a card for each student, the two are "matched" when the resource is charged out, allowing a complete history to be kept of each resource in the library. Also,

- Only a few seconds (the matching of the two cards) will be needed for charging out.
- The desk will automatically have a record of each resource and its due date.
- Overdue notices can be printed automatically. Notices of available resources (as soon as they come in) can be automatically printed and distributed.
- The library can keep accurate circulation statistics.

CARD CATALOG AND TITLE ACCESS: It is generally conceded that the current card catalog is a deterrent to good library use. A computer could reduce all the cards in the library to its memory, and then "call up" a resource or list of resources by subject, author, or title. It could also print out a list of the library's entire holdings in book form for faculty and researchers.

Applications and Limitations

As in all computer-based economies, the main factor is expense! Obviously, such elaborate systems are out of the question for smaller libraries. Even in a large library, their acquisition may be contingent on receiving use from aspects other than the library alone.

Another important point, at this moment anyway, is that these programs are only in the development stage and have yet "to come of age". Progress is so rapid in this field, though, that it can be assumed the technological shortcomings will be overcome in a matter of a few years.

Some Implications for Facilities

Greater use will be placed on spaces designed specifically for computers and data-handling. Some of the design criteria are discussed in the last paragraphs of this Section 6.

The old-time card catalog and its contingent bulk may be done away with, eliminating space needs in this area. Decentralized "call-up" points could be scattered throughout the area.

The traditional library circulation pattern of "in-catalog-stack-desk-out" may be in for a change. Eliminating the central catalog and possibly even the circulation desk will do away with these traditional bottlenecks that are now necessary.

Actual location of the computer center in the building will depend on other uses for the computer. It will most likely share a central position with the library and administrative areas in the building. See the discussion at the end of this Section 6.

GENERAL USE OF COMPUTERS

What Else Can a Computer Do?

While the functions of scheduling and library operation are two particularly knotty problems that can be ironed out by computers, there are many other functions in the modern school which can be handled by these machines.

Many of these "routine" duties have always consumed an enormous amount of time and paperwork on the part of teachers, administrators, and clerical staff. As the education industry grows, there is little or no indication that the time spent on these tasks will decline, or even stay constant. In fact, it seems clear that disproportionate increases will take place unless new methods are devised to handle them.

Another factor to consider is that if a school, or a group of schools, is planning to own or lease a computer, it can generally be said that it will not be economizing on its investment unless the machine is programmed to do as many tasks in as many areas as possible.

Some of the many functions that a computer can perform, in addition to scheduling and library work, include:

- Tracking of student progress through school (Particularly important in individually-centered curricula).
- Test scoring and interpretation of results.
- Setting of expected completion dates of units (in individually-centered curricula).
- Registration.
- Attendance and tardiness record.
- Distribution and inventory-control of materials, school supplies, etc.

- Bookkeeping and budgeting.
- Cafeteria, physical education, athletic scheduling and procedures.
- In-school evaluation of programs tried by faculty and administration.
- Space utilization studies, etc.
- Instruction (See Section 7).

Applications

While computers can and will be used at all levels of the educational process, current use has been somewhat restricted to secondary and higher levels. The reasons are obvious: as students move from what is usually a highly integrated elementary school to the more complex upper years, the paperwork increases. The use of individual-centered curricula on lower levels and its incumbent use of computers in many cases for tracking and for instruction, has implications for greater use of computers on these levels, too.

Organization and Limitations

The limitations and organizational patterns are typical of those dealing with the use of computers anywhere: is there enough UTILIZATION to keep this expensive machine running?

Some of the clerical expenses of today's schools can be cut since the machines are not only faster than people doing the same tasks, but they also neatly present the data gained in the desired form.

Role of the Teacher

Just how general use of computers (for other than instructional purposes) will affect the role of the teacher is an interesting point. As far as clerical duties are concerned, there are two conflicting factors.

First, the class lists, grade sheets, reports, etc., that a computer can turn out will save the teacher a great deal of clerical labor, which at the present may take as much as a quarter of his time.

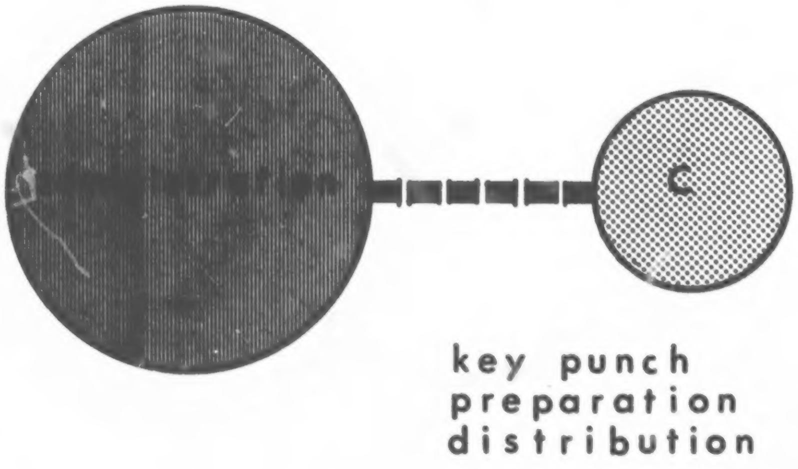
Unfortunately, though, much of the information needed by the programmer must come from the teacher and it must be in written form. While the brochures published as "Teachers Manuals" by the schools using computers are notoriously complicated, teachers will probably fall quickly into the routine. The point is, how much of a net reduction is there in the time that a teacher is expected to devote to clerical labor?

Some Implications for Facilities

Direct implications for facilities will, of course, depend on the organizational patterns utilized:

- If the school does not contain the actual computer center, key-punch, preparation and distribution facilities will still have to be provided for, in the majority of cases.
- If the computer is to be housed within the plant, special attention must be given to location, layout, and to the requirements that the machines themselves set up.

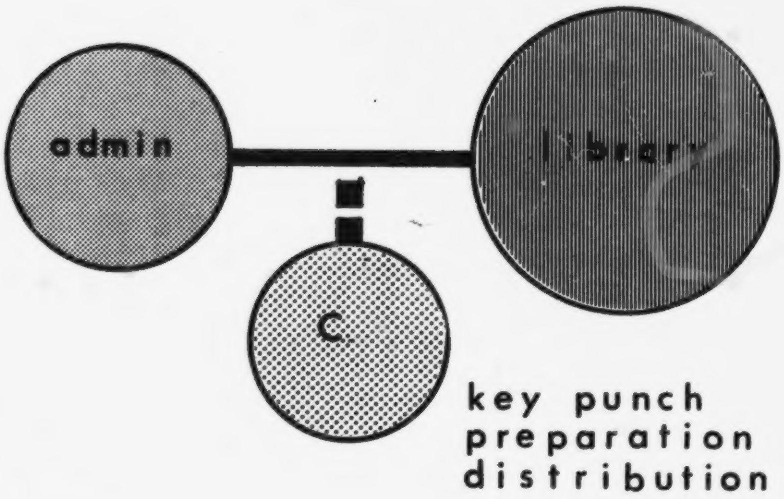
LOCATION OF THE COMPUTER OUTSIDE THE PLANT



How elaborate must the in-school facilities for key-punch and "read out" be?

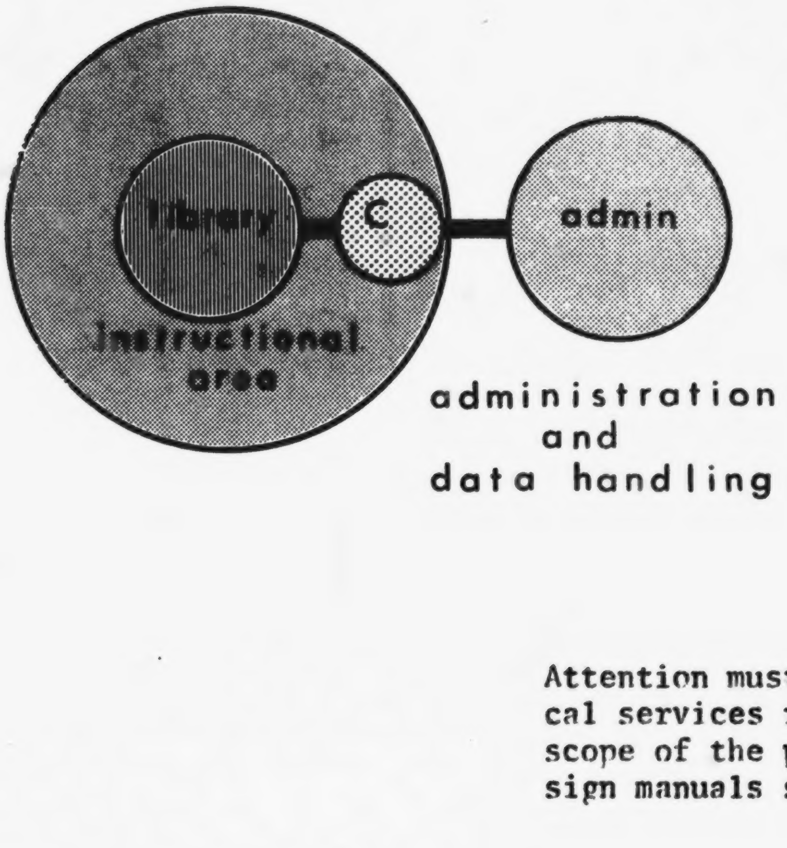
How many of the associated clerical functions are to be performed in the school?

If the computer is used primarily for administrative purposes, the distribution point should be related to the administrative facility.


admin
library
c
key punch
preparation
distribution

If the computer is also used in running the library, the distribution point should be located in a central area between the library and administrative sections.

LOCATION OF THE COMPUTER WITHIN THE PLANT


library
c
admin
instructional
area
administration
and
data handling

The same criteria that were applied above must be used. What relationships are implied by the intended uses of the computer?

Also, if the computer is to find present or future use in the instructional program (see Section 7), it would seem that a central facility, located "between" administrative areas, library area, and instructional areas would be the most desirable.

Attention must be given to the supporting clerical services required by the computer. The scope of the project, and the manufacturer's design manuals should serve as guidelines.

General Criteria for the Design of Computer Spaces

While each manufacturer of equipment has specific housing and environmental requirements, there are some generalizations that can be drawn:

- AIR CONDITIONING must be provided. Room air temperature generally should stay around 70° for best operation and the humidity should be in the 40 or 60 per cent range.

- AIR FILTRATION is usually necessary since dust accumulations cannot be allowed. The architect is also charged to design an easily cleaned area for the equipment.

- HEAT REMOVAL must be provided since the machines produce great quantities of heat that simply cannot be absorbed into the room. Common solutions are underfloor ducts at the cabinet bases, cabinet blowers, and pressurized plenums. Manufacturer's guides give details.

- LAYOUT is a factor. The manufacturer from whom the machinery is being bought or leased should be brought in on the design process as early as possible. Money can be saved with economical wiring and flow layouts. It may be desirable to have one person be able to monitor, and so on.

- POWER SERVICE requirements will have to be met. The manufacturer will list them.

- ILLUMINATION STANDARDS of usually 50 fc need to be adhered to. Direct daylight is usually not recommended.

- ACOUSTICAL absorption of a certain standard will have to be provided -- particularly with regard to reverberation. The manufacturer may not spell out exact standards.

- FLOOR must be level and must accommodate the wiring necessary to operate the computers. A false floor in accordance with manufacturer's dimensional recommendations seems to be the best since it not only allows for flexibility in wiring changes, but may also allow underfloor cooling systems.

IMPROVING THE COMMUNICATIVE PROCESS

7

THE NEED TO IMPROVE THE COMMUNICATIVE PROCESS

The Information Explosion

A major concern in education today is related to the great explosion of knowledge and information which has occurred in recent times. The total amount of recorded information has nearly doubled in the last decade and is expected to increase by similar proportions in the next one.

Education is being forced to perform the highly complex task of disseminating this tremendous volume of material, first to its instructional staff, and then to its students. Presenting this information involves two major processes:

- Sifting through and determining relevant information: This process involves selection of information based on its contents and objectives, which educators must then organize into a curriculum. In order to do this, the educational goals must be defined, and information must be organized with them in mind. The information must then be stored and finally presented in an orderly learning sequence. In the past, the classroom teacher with the traditional instructional aids has been more than adequate for planning and presenting material. Today, however, the information explosion is demanding improved methods of sifting, sorting, storing and communicating relevant information.

- Keeping abreast of new developments: This process has a great effect on education because it requires a new look at functions and roles. All information is funneled through the teacher to the student -- and as the body of information grows, the funnel, too, must expand. Since the teacher cannot act as the encyclopedic source of all information, the act of communication cannot be accomplished strictly in the traditional form, that is, always in class lecture. Special teachers, resources, and technology must be used to effect better communication between teacher and student, and to aid in the continuing education of the teacher.

The Population Explosion, and the Shortage of Qualified Teachers

The rapidly increasing enrollments at nearly every level of education has created a major concern for educators. This concern is further complicated by a reduced proportion of well-qualified teachers. Even while the colleges move to expand their efforts to turn out better qualified teachers, it is a safe bet that both the population and information explosions will act to perpetuate this concern. Operating under the ideal of free education for all citizens, American educators must make major improvements in the communicative process to offset these problems.

Psychology and the Learning Environment

For centuries educational philosophers and psychologists have been searching for the key to how man learns. It has been found that the educative communicative process must, above all, be designed to enable effective learning situations and environments. Psychologists have found that students learn most effectively by direct experiences and subsequent reinforcement of learning. Also, information organized in a logical, sequential order is a most effective means for learning. Finally the learning environment (comfort, social climate, etc.) can be a strong controlling force. The question must be asked, "By what means can the school enhance and make the learning situation more effective?"

The Technological Revolution

Modern technology has given education new methods, new systems and new devices for aiding the communicative process. These devices vary in function, in size, in cost, and in application and it is most important that teachers and administrators understand their goals and objectives. Too often they will reject these devices solely due to ungrounded, or partially ungrounded, fears such as technological unemployment, a greatly diminished role, or insults to their own creative ability. The facts, however, show that teacher's jobs are not at stake and that the use of the technical devices can often foster even more creative efforts by teachers.

Costs of Education

The greatest expense involved in running a school are those of communicating information; instructional expenses use up nearly 60% to 70% of the average school budget.

As the number of well-qualified teachers does not keep pace with the population explosion, what prices will schools have to pay for high-quality instruction? How can the technological advances in the field of aids and media contribute to keeping these costs in line?

THE COMMUNICATIVE ACT

> "Education in the full sense is then the development of this primary human capacity and need for entering into communication with others. Because we live by communication, it is by the handing on from generation to generation the techniques of living that have been developed by our ancesters and which are in force all around us -- it is by learning these that we become able to take part in the human community."
>
> -- John MacMurray, in The Educational Forum'

The Act of Communication

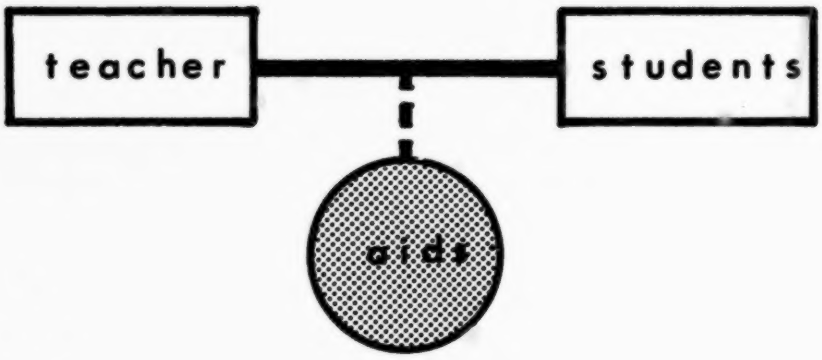
The act of communication, as indicated above, is the great single purpose of education. It is the communication of facts, beliefs, theories, ideals, and skills which allows man to grasp and comprehend the world about him. Man has been endowed with the gift to being able to transmit and receive knowledge and thus further develops his understanding. The act of communication takes place when two bodies exhange information through the use of some medium. While the human voice is the most common medium by which men communicate, the written word and picture are other important devices to this end.

Improving the Act: "Systems" Approaches

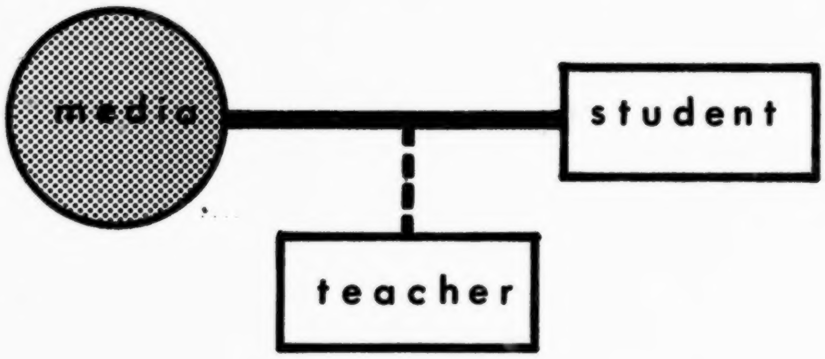
In order to improve the act of communication, one must seek to improve either the bodies which exchange the information (i.e., the student, and the teacher or device) or the medium through which they communicate. Its recognized that one method of communication may be more effective than another for a specific learning situation; often these methods are organized into a system as determined by the requirements of the individual and/or the medium. This sequence then constitutes a "systems" approach to learning. The design of this system is based on teaching functions, learning functions, and the mediating functions between the two. This Section will deal primarily with these mediating functions.

Instructional Aids and Media

We will establish two general categories of devices or means which may be used to improve the communicative process: instructional aids, and media. It is important that these terms be defined at the outset, and that the reader keep the distinctions in mind as he considers each:



INSTRUCTIONAL AIDS are methods or devices which present supporting material, usually intermittently, as aids to the teacher in presentation.



MEDIA refers to methods or devices which are primarily designed to present complete bodies of information themselves.

"The chief distinction, then, lies in the extent to which the device or system of devices carries the burden of instruction; a medium is largely self-supporting, while an aid serves to supplement the instructor's presentation. Obviously, depending on their manner of use, some devices may either be aids or media."

-- *New Spaces for Learning*

INSTRUCTIONAL AIDS

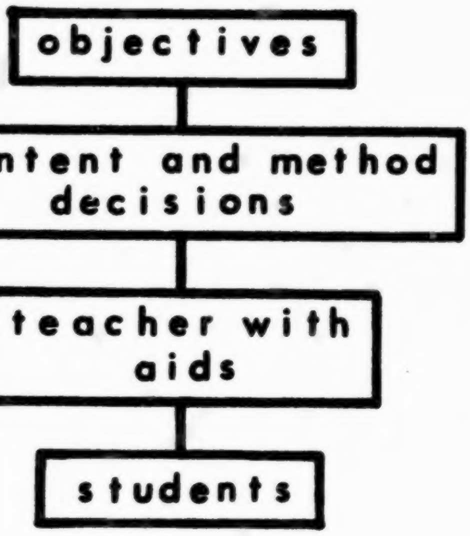
Traditional Instructional Aids

Instructional aids have long been used in education. Some of these "traditional" aids might include,

- The printed book, periodical, and pamphlet.
- The two-dimensional graph, chart or diagram.
- The three-dimensional model, demonstration, and experiment.
- The chalkboard and other informal "write-on" surfaces.

The Purpose of the Aids

The purpose of the instructional aids is to supplement and support the instruction provided by the classroom teacher.



Once he has planned his lesson in terms of his objectives, the teacher must then decide on the most effective ways of presenting the information. The material is often said to "lend itself" to one way of presentation over another. He will then decide upon the types and amount of instructional aids that will best support the presentation.

These aids have long been effective, and still play a major role in education. Many have undergone much improvement and are still being further developed. The educator must accept these traditional aids, be he cannot rely on them alone. New aids have been developed and are proving beneficial to communication; these new aids must be understood and used where they will be most effective.

The Advances in Instructional Aids

A vast number of audio and audio-visual aids has flooded the field of education in the past decade. Many other advances are on the horizon.

Teachers have often found that students can learn either more rapidly or more effectively, or both, through the employment of aids in the classroom:

- Students can learn more effectively with the experiences the aids can bring to the classroom.

- Teachers can reinforce learning by the use of many of the new aids.

It is most important that all become familiar with the new audio and audio-visual aids, and are aware of individual capabilities and limitations.

AUDIO AIDS

What Are They?

We will consider audio aids in a strict line with the definition of the word "audio." This means that these instructional aids present only information to be heard, as opposed to devices which have the capabilities of presenting both sound and picture.

The two main types of audio aids employed are the phonograph and the tape recorder. While these devices are far from new in the education field,

AUDIO AIDS [CONT'D]

both find wide acceptance for a multitude of classroom chores.

The Phonograph

The phonograph was one of the earliest devices used as an instructional aid. It has had many uses, including the presentation of music, historical and dramatic plays, speeches, and even instruction in foreign languages. Playing devices come in many different forms and sizes which, coupled with the desired quality of reproduction, will influence the cost of equipment. The trend in this field is toward sterophonic reproductions because of the realism possible.

Limitations on the use of phonographs as audio aids include:

- It is diffucult, or nearly impossible, for a teacher or student to make his own recordings, or gear them exactly to the level on which instruction is taking place.

- Records are breakable and tend to wear out with extended use.

- Too often the available recordings are not exactly what the teacher wants, but he uses them anyway, to the possible detriment of continuity of presentation.

- There is likely to be a scheduling problem in obtaining machines and recordings.

The Tape Recorder

The tape recorder, which is fast replacing the phonograph in many schools, operates on a simple principle of electromagnetic sound recording and amplification. It is capable of doing all that a phonograph can do while eliminating many of the latter's limitations:

- The tape recorder allows instructors to prepare, present, and evaluate their own material quickly, easily and inexpensively.

- Tapes can be erased and spliced to improve instruction, correct mistakes, or adapt them to other levels of instruction.

- Students can use the recorder to present their own work, to reinforce and to evaluate learning.

- Tapes are less expensive and often much more durable than phonograph records.

The major limitation to tape recordings lies in access and storage. Threading and rewinding also create problems in producing devices for rapid access to taped materials. Methods are available technically to eliminate many of these problems: continuous tapes, and automatic rewind and stop devices have been invented, but widespread use is currently limited by expense.

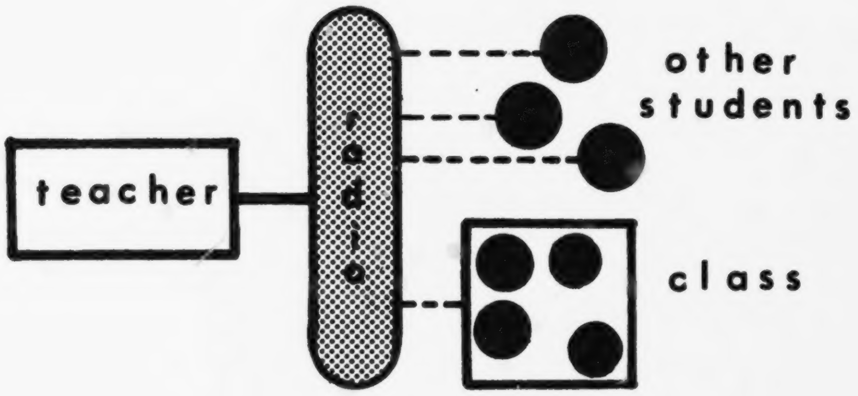
Other Audio Aids

While the phonograph and tape recorder have been the prime audio aids employed in classrooms, many new and exciting devices are on the way. They include possibilities for radio and telephone transmissions. While each of these programs has been tried, some even on a large scale, they have found little widespread adoption as of yet.

Radio Transmission

Many teachers have found that by using radio, they can effectively reach students in off-class hours. So far, this has been found most effective at higher levels of education where students will be able to concentrate and comprehend the presentation without the guidance of the teacher. Very possibly this type of instruction may be received in homes, dormitory rooms, and other "schools-away-from-schools." (see Section 5). The teacher will present material, either live or recorded, as an aid to his in-class presentation.

AUDIO AIDS [CONT'D]



An example of this is the presentation of college english or music lectures on-the-air at night as a supplement to classroom lecture. Not only may these programs have specific value to students in certain courses, they may have a general interest value for all listeners.

Another possibility is the employment of short-wave broadcasts for language instruction; the student will be able to hear the native tongue, and learn to converse in it much more effectively.

The problems involved with the use of radio often limit wide applications:

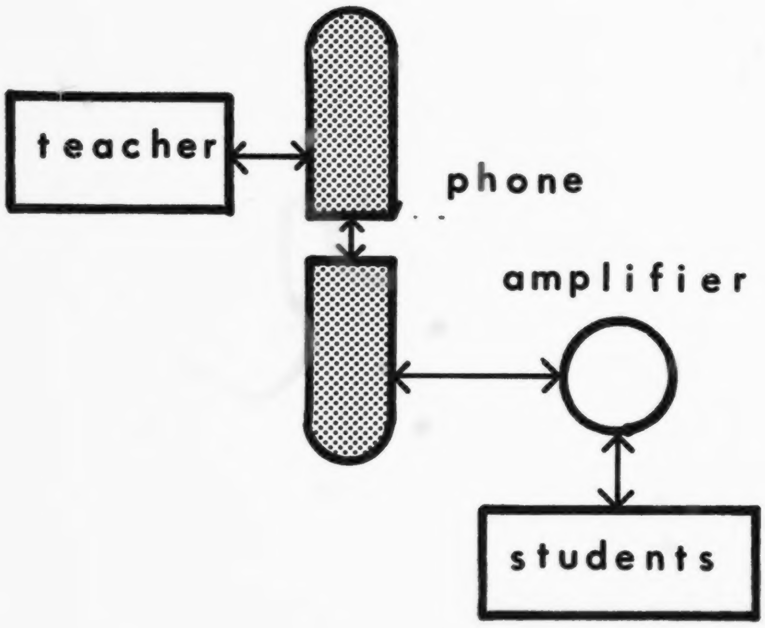
- Schools must either have their own studio and broadcasting facilities, or utilize time on regular commercial stations. Considering the expense of individual facilities in each school, there are implications for co-operative development of these resources. (see Section 9).

- Scheduling of personnel, equipment and time is often a real problem.

Telephone Transmission

In recent years many educators have found some value in using the telephone in aiding instruction. Students have been able to call teachers for additional help during special hours. Instruction, either live or recorded, can also be transmitted over telephone lines from distant locations and then amplified in the classroom. Questions can be asked and unclear points can be reinforced, thus making it effective as an aid.

Tele-Lecture, a system available through the telephone companies, has been effective in many operations; one example in this area includes use of Tele-Lecture in the Catskill Project to provide limited instruction to small schools in remote areas.



One advantage of this system is that it can be put into use very easily in existing facilities. Only amplifying devices are required for greater effectiveness in reaching more students. The number of available channels is another strong point in favor of adoption. More varied instructional material can be made available, and the two-way feature allows the teacher to immediately change course if students are not catching on.

AUDIO-VISUAL AIDS

The Importance of Being Able to See

The belief in the saying that "a picture is worth a thousand words" is not unfounded or without meaning; the instruction process is often greatly strengthened through using visual presentations as instructional aids. Not only can the student visualize clearly what is being talked about, but the chances are that its impact will hold his undivided attention. Many different devices and types of equipment have been developed to present both audio and visual pictures of what is being put forth. Some are quite common, while others are new and have exciting implications.

Filmstrips

After the second world war, a great deal of interest was directed toward the use of filmstrips in education. A filmstrip is a short series of pictures arranged in a sequence on a continuous roll

AUDIO-VISUAL AIDS
[CONT'D]

for the purpose of visually presenting supplementary information. The words are either provided by the teacher in discussing the frames, in print underneath the frames, or on a tape or phonograph record designed to accompany the filmstrip. A recent advance has been the use of magnetic sound tracks in conjunction with the frames; the sound track uses a scanning-playback device to automatically provide accompanying sound. Sound time is limited, but is effective in helping to follow the pictures.

The material presented in filmstrips is usually of the single-concept variety. These filmstrips are usually produced or sponsored commercially, which is undoubtedly a limitation. Teachers may, however, be able to put together filmstrips of their own in the production center if one is available to him. (see Section 9).

Slide Presentations

Slides can be produced either commercially, as in the "teaching kits," or by the teacher himself. They have the advantage of being single units that can be arranged in any sequence for presentation; and this sequence can be changed to accommodate different uses, for applications at different levels, and for subsequently improving the effectiveness of the presentation. Discussion material for slides is most often provided by the teacher, but may be noted on "insert" slides placed in the sequence. There are also possibilities for using "sound slides" for presenting discussion.

Various sizes, makes, and types of slide projectors are now available. There are small, battery powered slide projectors which can be used by individuals. Larger projectors come in both manually-operated types and those set up for remote control. The latter have the advantage of not tying the instructor to the machine where the noise of the blower is most likely to interfere with hearing him. By carrying a remote-control unit with him (there may or may not be a cord), not only can the teacher control forward and backward motion of slides without returning to the projector, he will be free to point out things in the slide, and so on.

Slide presentations, too, are susceptible to the general requirements listed under "facilities" at the end of this topic. One point that should be emphasized, however, is that most projectors, in an effort to control the high-wattage bulbs needed for good images, produce a good deal of fan noise. This would indicate that remote projection (using the remote-control device) might seem the better solution to the problem.

The limitations on the use of slides as instructional aids have to do with their size and individual nature. It is difficult to catalog and file so many slides in order that they may be assembled readily, arranged and rearranged for future presentations. Another limiting factor which may come into play is the lack of continuous motion, although movement is possible under certain circumstances.

Motion Pictures

The science and technology of making motion pictures has long been directed toward applications in education. Thousands of films have been produced and disseminated throughout our nation; almost every topic possible has been covered in one way or another, and the varieties of presentation have been and remain unlimited. Films can be made in various formats and lengths, and may be single-concept-oriented, or may present whole areas of information. Live and animated motion pictures are most often used for effective presentations of material.

The technical advantages of motion pictures include:

- The effects of motion and animation are very valuable in making the learning experience as vicarious as possible.
- The uses of magnification, close-up, and time-lapse photography can point out specific objects and processes.
- Sound and color reproductions can be of high quality.

AUDIO-VISUAL AIDS [CONT'D]

Film Types

Motion pictures for use in education have been pretty much limited to the 16mm type in the past because of the definition problem associated with 8mm types. This problem, however, has been resolved to a high degree and the use of 8mm film is being greatly expanded. The advantages of the 8mm are reduction in film cost and size (both about one-half). Each type of film requires its own projection equipment which will, of course vary in size, quality, durability, and cost. 8mm cartridge-loaded projectors are becoming very popular, though, because of their greater ease and speed of loading.

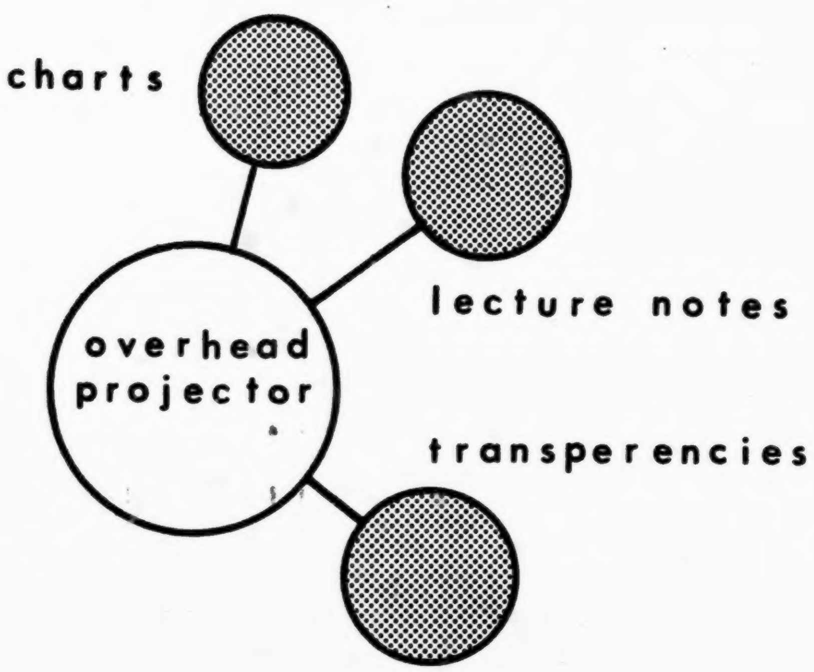
Limitations on Use of Motion Pictures

Limitations on the use of motion pictures include the costs of films and equipment, the problems of obtaining films and storing them for future use, the problems of obtaining films for lease at the precise moment of need, and the fast antiquation of many films. It is an extremely expensive process to actually produce motion pictures of high quality in the school plant; this production is currently limited to colleges and schools with wide economic resources.

Because of the problems of obtaining films, even for lease, and the problems of producing motion pictures on the premises, there are many implications for co-operative development of these resources (see Section 9).

Special Projection Devices: The Overhead Projector

Teachers have found that the chalkboard and other "write-on" surfaces are valuable aids to instruction, but that they also have many limitations (particularly in large groups). They are often susceptible to glare, and beacuse of their placement on the wall (low enough to be written on) are often blocked from view by the teacher or other students. The overhead projector not only has the advantage of projecting a larger image, but itsis usually at a better viewing angle for the students and is less susceptible to glare. The teacher using the overhead projector can also face his students as he is talking and writing, an impossibility in using a chalkboard.



Material is presented on transparent plates, prepared ahead of time, or on a wind-up roll of paper that the teacher may write on as he lectures. Two-dimensional graphs, charts, and drawings that were once almost impossible to include in the presentation can be placed on the projector. Projectors may also be equipped with special polarizing devices for use with special transperencies creating an illusion of motion.

Another factor that has given overhead projection a boost is the fact that many commercial copying machines, such as manufacted by Technifax, can produce transperencies for projector use as well as back-and-white prints. This allows the teacher much greater use in preparing instructional materials.

Some limitations on the use of the overhead projector are its cost, its bulk, and the fact that it usually has to occupy a position near the front of the classroom. Teachers then using the blackboard find that the projector may be in the way.

Opaque Projection

The opaque projector provides a method for projection of any written, drawn, or photographed material. It has been used most often in the past to magnify all kinds of source material in the classroom.

Its prime limitations lie in factors inherent in the design of the machine. It is big and bulky. It has no built-in way to enlarge or reduce the projected image and often has to be moved all around the room to fit the image on the screen. Focusing tends to be erratic and often the entire field cannot be brought into sharp focus. The light intensity is quite low, and even the fan required to cool the bulb is quite noisy. The lighting levels in the room have to be very low in order not to interfere. Another problem is that the teacher must be located with the machine at the back of the room in order to operate it.

Micro-Projectors

A special type of projection has been developed for use in presenting microscopic images to large groups. Teachers find that they can point out more easily the various organisms, cells, and their functions to a greater number of students at one time by utilizing this device. The uses are, of course, limited by the subject material and by the difficulty in setting up the slides for projection. The machinery is bulky, the image is often small and hard to focus, and the lighting intensity is likely to be very low.

IMPLICATIONS OF AUDIO AND AUDIO-VISUAL AIDS

Solving the Problems

The use of audio and audio-visual aids in education has attempted to provide solutions to many of the problems presented at the beginning of this Section. For one, providing more stimulating and more effective learning experiences to students is an attempt to teach based on the principles of learning. Students can supplement and reinforce learning more easily. Individuals who are either very gifted or very slow can use the aids for either enrichment or assistance in learning. Many of these aids can make the teaching of large-groups possible, therefore relieving some of the tensions caused by swelling student enrollments and shortages of qualified teachers. Economic savings may often be realized if the aids are used extensively to reduce other instructional expenses.

The Teacher's Role

The teacher will undoubtedly alter his techniques of presenting material, and adopt new methods using the new resources made available to him. This necessarily means that lessons will be more pre-planned for both content and sequence. He will have a working knowledge of the various resources available in order to apply them most effectively. The teacher may also be called upon to become a kind of technician, able to operate, maintain, and possibly repair some of the equipment. The problems of storage and access may have to be solved with all his imagination. Most important of all, the teacher will be obligated to make use of the aids and equipment made available to him in order to provide the best instruction possible.

The Student's Role

With the increased use of audio and audio-visual aids in schools today, the student is given new responsibilities for learning. He must make it a point to be attentive and receptive to the presented material, particularly in cases where it may not be presented again. He will have to accept the loss of continuous personal contact with the teacher, and learn to study material in larger groups or individually. He must also make it a point to aid the teacher wherever possible so that improvement in presentation may be made.

Role of the Facilities

"Acceptance of audio-visual aids has progressed to the point where architects and administrators now recognize that sufficient revisions can and should be made in the traditional rectangular classroom to permit improved utilization of projected pictures and electronically amplified sounds,"

-- John W. Wentworth, in
Journal of the SMPTE

For audio-visual aids to be most highly utilized, facilities must be provided that will controbute to their effectiveness. As noted in the preceding quote, traditional instructional spaces must undergo some revisions:

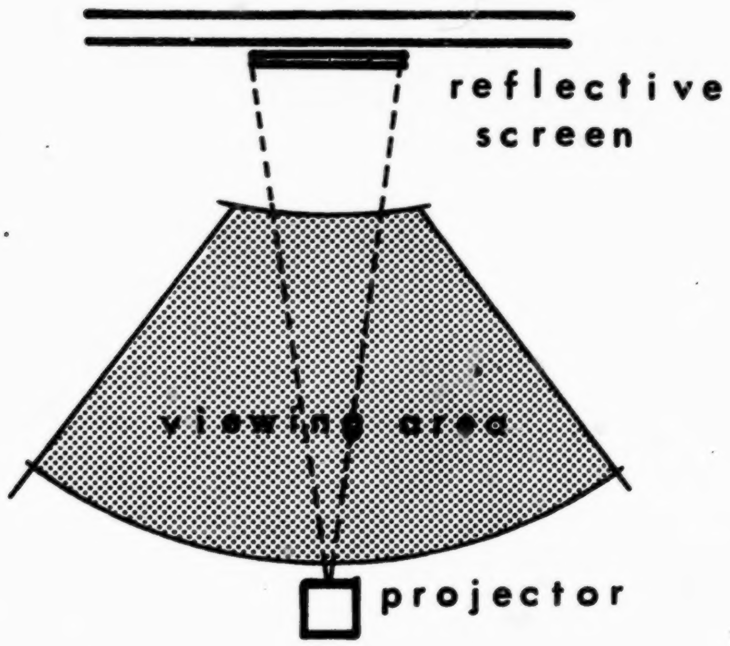
- The size and shape of the space should be designed in full consideration of the number of students and the types of aids to be used. Viewing angles for best conditions have been established and should be adhered to. Image

IMPLICATIONS OF AUDIO AND AUDIO-VISUAL AIDS [CONT'D]

size and legibility standards have also been determined. In some cases seats may be sloped to allow a full view for each student.

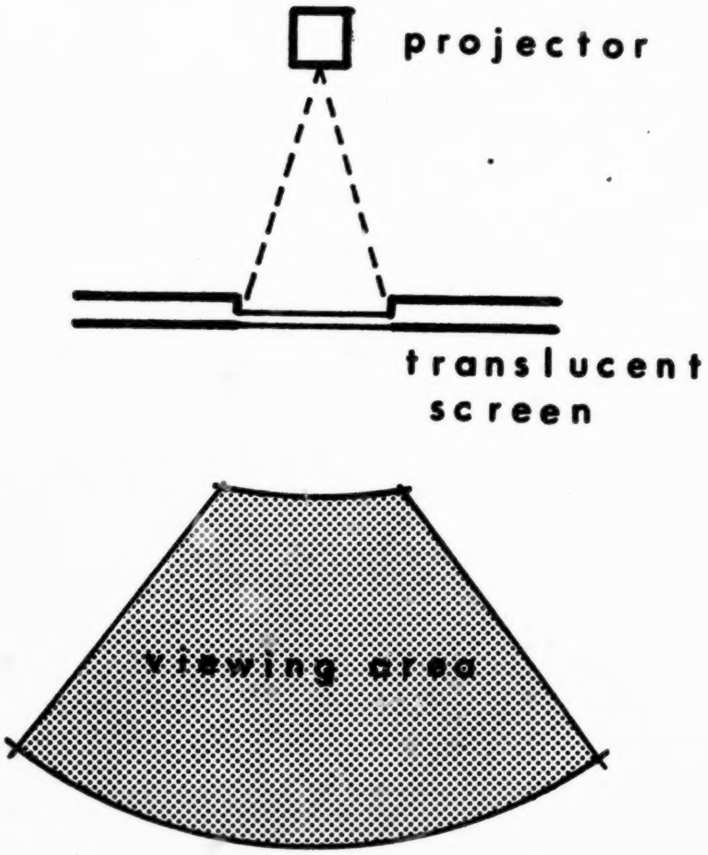
- The physical treatment of the rooms will depend on the types of aids used. Lighting, acoustics and mechanical equipment must be designed to allow the use of aids to their fullest advantage.

- Projection methods and areas for them must be planned to allow ease in using and controlling aids. The advantages of both front and rear projection must be considered and, once the choices are made, facilities designed for their use. Some considerations for each of these methods is listed here:



FRONT PROJECTION is achieved when the projector is placed on the viewing side of the screen. Its main advantage is that of its conserving space since the projected beam occupies space above the heads of the audience. It is also extremely mobile; the projector and screen can be set up anywhere. Its disadvantages include the effects of ambient light on the screen which reduces picture brightness (this means that rooms must be considerably darkened), the distractions of noise, the problem of people and objects in the room interfering with the projected beam, and the inconvenience of having to operate the equipment from the back of the room.

REAR PROJECTION is created when the projector is located behind the screen where the image is directed. The use of rear projection has many advantages which in-



clude: effects of light in the viewing space affect the quality of the picture to a much lesser extent than in front projection, problems of noise and distractions by equipment are eliminated, teachers can stand in front of the screen to point out information without casting shadows on the image, and equipment can be set up and film rewound while the class is in session. Unfortunately rear projection requires additional space apart from the instructional area, which becomes an important cost consideration. The teacher must operate equipment remotely, or have it controlled by another operator.

Types of Facilities

The discussion of the role and the general design needs of facilities for audio and audio-visual aids gives a fairly clear idea of what types of facilities would be required:

- The audio-visual resource center: this is a place where all resource materials are stored, catalogued and made accessible to teachers and students. It may be incorporated in the school library or may be a part of a larger center built to serve the needs of several schools. (see Section 9).

- Teacher planning areas: these spaces will include work and conferences spaces for teachers and assistants. Arrangements for previewing material for class presentation should be made.

- Instructional areas: the classrooms should be designed to complement the use of audio-visual equipment. The installing of this equipment in spaces for large-group instruction is discussed fully in New Spaces for Learning.

- Projection areas: these spaces must store material and equipment for use. They will be much more elaborate where rear projection methods are used.

- Student study areas: these areas must be provided for students to use audio-visual aids which the teacher may assign for independent study. The spaces should be controlled for light and sound, and should provide suitable work area for note-taking. These spaces may be a part of the library, or located independently in the building.

OTHER AIDS

Miniaturized Instructional Aids

It has been shown that students can learn certain information most effectively by performing a manual task. Because of this, many teachers prefer to have their students do experiments and special projects as supplements to classroom instruction. Many mechanical, electrical, and scientific devices have been produced commercially to enable students to learn basic theories and concepts, but on a minaturized basis. These devices may vary in size, function, complexity and expense. Most are designed as simply as possible to enable wide use among various student levels. Examples of these minaturized aids include,

- Electronic panels and components to teach principles of radio, amplification, power and transmission.

- Computer panels to teach computer principles and programming.

- Models of machines, and motors with transperent parts so that the workings can be seen.

- Minaturized science experiments to demonstrate scientific phenomena and principles.

These materials are usually accompanied by easy-to-follow instructions to allow for student use. Not only can the miniaturized aids be helpful as supplements to classroom instruction, they may eliminate the need for full-scale labs, etc.

The Teacher and Miniaturized Aids

The teacher will supply students with available miniaturized aids when he believes that they may be most effective. They may be used in classroom work, or he may direct students to use them individually. The teacher must be able to fully explain all the subtleties of the aids, a demand that is often not placed on the teacher in the conventional lecturing situation. Further, the teacher may become sort of a technician, responsible for keeping the aids in working order.

The Student and Miniaturized Aids

Since the design of the miniaturized aids is directed at the student, he must learn to use them to enhance his educational experience. Learning to operate the aids should be easy, but students should be prepared, as they are now in lab experiments, for temporary setbacks and malfunctions. The student may have to assemble and disassemble the equipment, a job which should aid in understanding the functioning of the apparatus.

Facilities to Support Minaturized Aids

Facilities to support these aids need not be special. The major role of facilities for these aids includes: adequate space for storage, with access by students and teachers; the possible need for special services (gas, water, power, etc); and possibly spaces for individual use of the aids, or even spaces for team use. Perhaps the best plan would be to incorporate the devices into facilities which are discipline-oriented, where individual aids could be kept in a center.

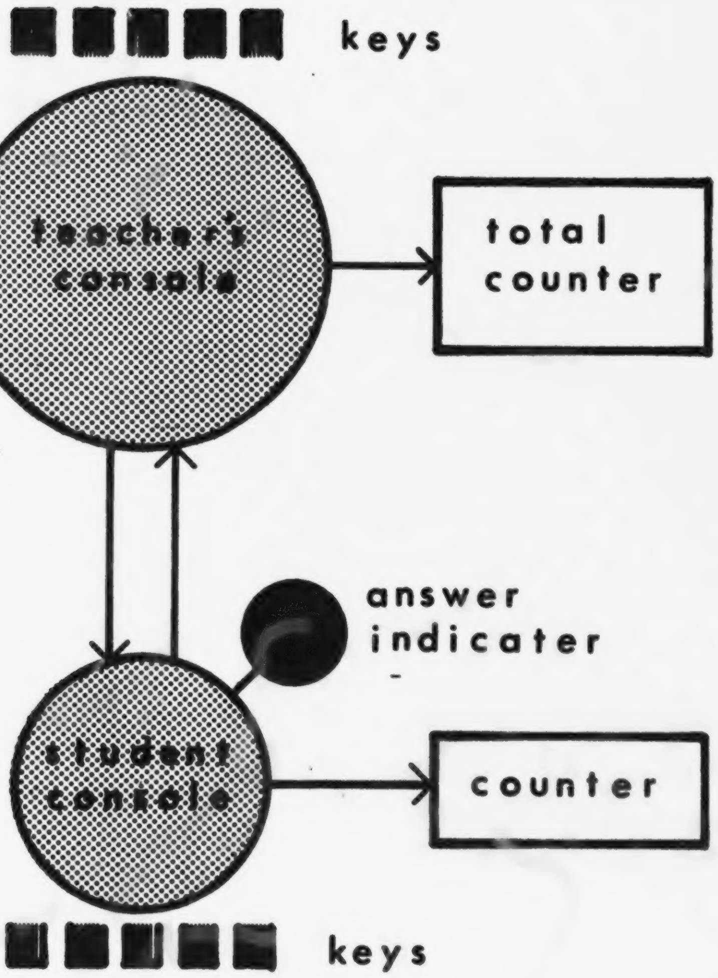
Student Response Systems

The acceptance of large-group instruction for solving problems of economics and staff utilization has created problems in two-way communica-

OTHER AIDS [CONT'D]

tion. Although the audio-visual aids have provided improvements in the effectiveness of large group instruction, the major complaint of lack of the two-way communication between teacher and student still stands. The student response system is a device which allows the student to respond to questions asked by the teacher in order to reinforce learning, and to provide the teacher with some clue as to the effectiveness of his presentation. Many different kinds of response systems have been developed, some simple and others which are highly complex; like all instructional aids, these systems vary in function, cost and dependability.

There are basically three components to response systems: the control console, the student control set, and a counting device of some kind:



The teacher console enables the teacher to engage a circuit for a correct response to a question asked. The counter will then record student answers and check them against the correct response, listing the number of right and wrong answers.

The student control set enables the student to select a key (say from 1 to 5) which he thinks is the correct answer to the question asked. He may be told immddiately whether he is right or wrong (by a light), or he may be allowed a second choice, depending on the response system used.

The counter not only provides the teacher with an immediate tally of right and wrong responses, but it usually prints out a record for future reference.

Various disadvantages are inherent in these response systems. First, only objective questions requiring objective answers (a, b, true, false, etc.) may be asked. They are also quite complicated from the technical point-of-view, and breakdowns are a real problem. Costs of installation and maintenance may be high, and student maltreatment is a problem. These systems are being continually developed, though, and these problems are being gradually ironed out

The Teacher and the Response Systems

In planning lectures, teachers using these systems should look for natural places in their presentations where questions may be asked, (1) so as not to break continuity and (2) so as to provide important points in the lecture that may be really indicative of whether or not students are comprehending the information. The teacher must become experienced in analyzing the data gained from these questions to improve future presentations.

The Student and the Response Systems

The student, too, must learn to use these aids to his benefit. He should attempt to answer all questions honestly without guessing in order to provide fair and accurate evaluation. The student should seek additional aid on his own if he becomes concerned about his learning as indicated by the reinforcement device of the system.

Facilities for Response Systems

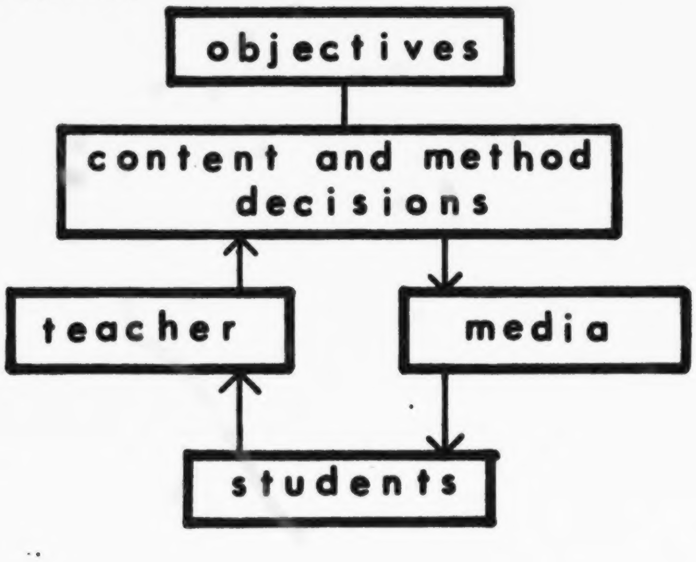
The student response system is generally designed to be incorporated in spaces for large-group instruction. Provision must be made for wires and conduits which might create hazards to students if left lying on the floor or strung helter-skelter through the lecture room. The teacher console and the student control set should both be built-in to the lectern and the writing surface so they will not interfere with note-taking, etc,

MEDIA

Media: The Goals

The educational concern, as noted in Three Meetings in May (see note, page 4-5) is to "make more information available to more people in a shorter length of time at less expense and using less teacher time." This is not only a mouthful, but is also a tremendous problem. It is to these ends that various media have been designed, studied and researched in labs and schools across the nation. Other purpose of media may be to "make learning more effective by presenting information which is dynamic, emotional, realistic or stimulating," or to "extend the inherent limits of the teacher, the facilities, and the student's own experience."

The Definition



As originally defined in this Section's introduction, media are systems of devices and instructional materials which are designed to present a complete body of information. The student may learn directly from the devices without necessary contact with the teacher. The teacher's role is to determine the objectives of instruction, and the methods and content to be used in presentation.

Various types of media have been developed technically and educationally and are found in many of the nation's schools. Much research is being devoted to making improvements in the older media and the development of newer methods.

TELEVISION

The Impact of Television Upon Education

In the last decade or more, many projects and experiments have been performed to discover the potential of television in education. Most of these projects have been directed and financed by corporation grants; the Ford Foundation, for example, has spent over twelve years and many millions of dollars in grants to evaluate television.

In 1956, the Ford Foundation sponsored a pioneer project in educational television in Washington County, Maryland. Results of this study and others like it are now plentiful. These results generally show that television can be effective in offering instruction, both in terms of motivation and in terms of economy.

Television is perhaps the most instrumental force by which schools are effecting changes in their programs and curricula today. Research grants and federal funds are being offered to schools who feel they need the use of TV for improving instruction. It is important that both educator and architect understand and be aware of the effects of this new medium, not only terms of the technology supporting it, but also in terms of its effects on staff and curriculum.

It should be noted that television is available both for use as an instructional aid, and as a medium. Since the great implications for the future are in the latter category, television is discussed in this part of Section 7.

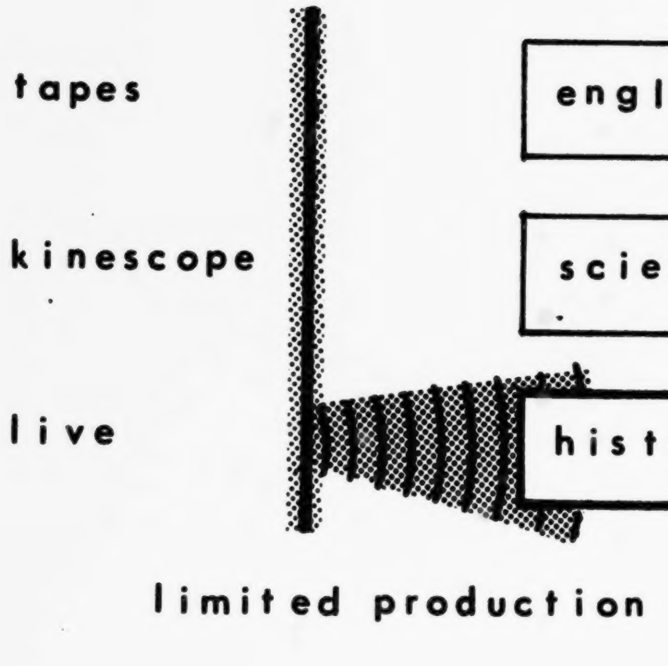
Understanding the Technology

In order to fully extract from television its implications for education, one must first understand the basic technology involved. Some of these technological considerations include:

- **PRODUCTION** can be achieved in a number of ways. The camera has developed from the big and bulky affair it once was to a compact mobile unit which can be used in more ways and in more places than the older models. Two types of cameras are primarily used: the image orthicon which requires less light and gives a better picture, and the vidicon which is less expensive. New types of lenses allow close-up viewing and magnification, not to forget the wide panaramic views sometimes required. The perfection of color TV will widely enhance its value as an educational medium.

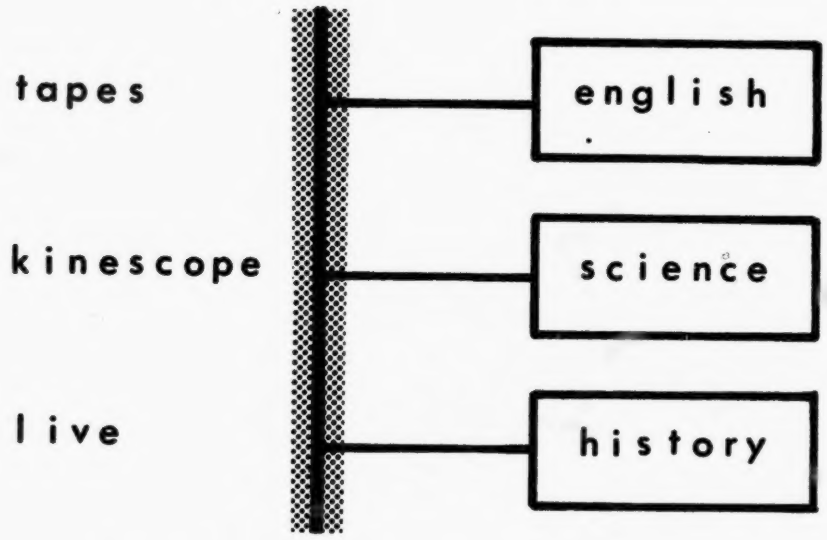
- **TRANSMISSION** is the second step of television technology. After the camera performs its function, the next step is to collect and prepare images for broadcast. The production is either directly transmitted or recorded by a video tape or kinescope for use later.

The process of transmitting is of major concern in the adoption of educational television. Essentially there are two methods:



OPEN-CIRCUIT TRANSMISSION is the method employing electromagnetic frequency waves as the connective medium. Advantages of this type of transmission are that a greater range can be covered at considerably less cost since air is used as the medium. The major problem is that the number of channels available are very limited, and licensing must be obtained through the FCC. Rarely are there enough channels available for educational use to make this highly feasible.

Researchers are tying to discover new ways of open-circuit transmission which may reduce these limitations. Such methods include 2500mc and microwave transmissions and should be studied before television decisions are reached.



simultaneous production

CLOSED-CIRCUIT TRANSMISSION utilizes wire and cable as its transmitting mediums; waves are not allowed to travel freely in air. No antennas are required, eliminating frequency interference. The use of the cable, however, creates major problems in trying to cover large areas at a reasonable expense; costs of wire and its installation often limit its use. The advantages include the availability of several channels which allow many programs to be provided at the same time.

- **RECEPTION** is usually found to be similar to that in the home. Receivers vary in size and expense; either color or black-and-white may be provided for. Whether the transmission is open- or closed-curcuit will make a difference in the design of receivers, though.

Using Television in Education

In essence the purpose of television is to provide better instruction to more people at less cost. This improved instruction can be provided by using the best lecturers to present well-organized and supported lessons that are stimulating and motivating. More people can be reached by using TV as a large-group instruction method; and by using fewer teachers to reach more people, instructional expenses may be cut in some cases.

Educational television has been the subject of a great many research programs, a brief list of which may include,

- The Washington County project which has made considerable use of television (closed-circuit) in all instructional fields.

- A national TV series of physics lectures and demonstrations called Continental Classroom

TELEVISION [CONT'D]

was instituted in 1959 and has proven to be highly successful.

- The Chicago City Junior College designed TV instruction to present complete courses to those who could not attend regular courses, such as housewives, special high school students, and rehabilitated prision inmates.
- New York City Schools have set up a system by which special resources, kinescopes and tapes are distributed by a commercial station.
- The Midwest Program in Airborne Television instruction (MPATI) broadcasts video tapes to member schools (some 2,300 in 1961-1962) to achieve regional coverage at less cost.

Educational Patterns Implied

LARGE-GROUP INSTRUCTION: because of the necessary economic considerations invloved, television will often assume a form of large-group instruction. As this implies, there will be a need for certain staff organizations. If the television broadcasting originates in the school plant, a "classroom teacher-studio teacher" team will probably be organized to handle the instruction.

THE TEACHING TEAM: the existence of this teaching team is probably the ideal situation for handling television in the school. Teaching by Television points out the functions of this team:

- The studio teacher, classroom teachers, and curriculum specialists co-operatively plan the course in advance, and prepare a guide.
- The studio teacher presents, explains, and demonstrates the major points of the lesson, raises questions and stimulates interest.
- The classroom teacher prepares students for the telecast part of the lesson, answers all questions, clarifies points, leads discussion,

makes assignments, gives help to individuals and supervises testing.

- The studio and classroom teachers confer regularly to evaluate lessons and to make improvements as required.

SCHEDULING: One of the major problems in the use of television is scheduling. To have students ready for TV is one problem, and to have equipment ready is another. The use of the computer and special time periods may have to be provided for best utilization of TV.

INDIVIDUAL STUDY: The technological advances in the use of video tapes has provided the means and methods for using TV as an individual study medium. Students may review taped lectures, or observe ones they missed. Special films, demonstrations or programs can be taped, catalogued, and stored for further access.

The Teacher's Role

The major role of the teacher will be his part on an instructional team. He must aid in planning, presenting (or directing), providing individual help and evaluation, and in making judgments on the effectiveness of presentation. The need to "make every shot count" in TV forces the teacher to critically examine material and decide on the best ways of presenting it. Leaving many of the clerical burdens to others, the studio teacher can primarily concentrate on this important last point.

The Student's Role

The *Washington County Closed-Circuit Television Report* clearly and concisely points out the role that the student will play in Educational TV:

DURING THE TELECAST

- Listening
- Observing
- Taking notes
- Following directions
- Organizing information
- Raising Questions
- Weighing alternatives
- Noting needs for more information
- Reaching tentative conclusions

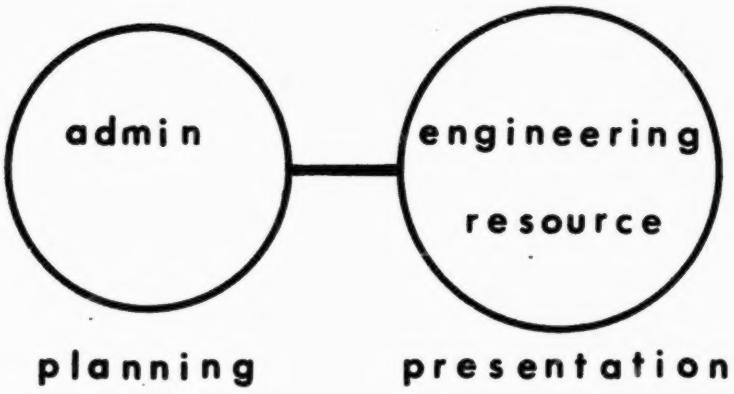
TELEVISION [CONT'D]

AFTER THE TELECAST

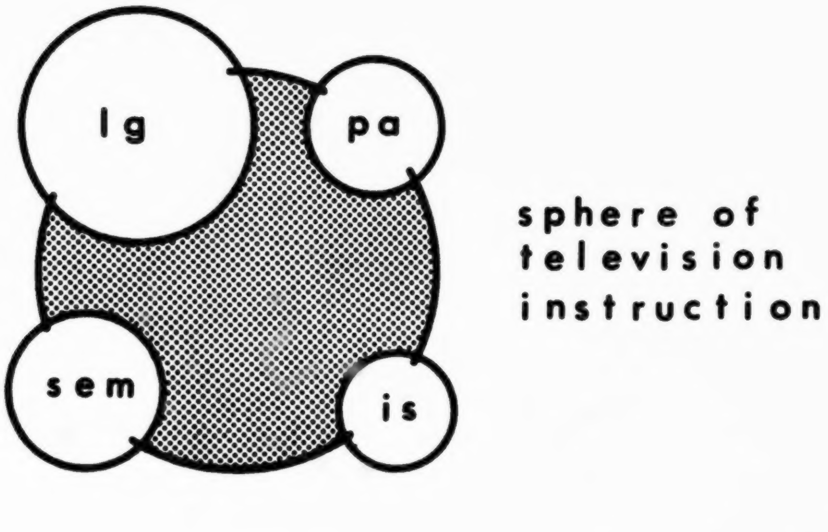
- Asking and answering questions
- Discussion
- Practicing
- Performing experiments
- Investigating
- Reading
- Working on projects
- Making applications
- Creating
- Evaluating

The Role of Facilities

One of the major complaints about educational television by classroom teachers is that the facilities are often inadequate in supporting the instruction. Interesting data verifying this statement can be found in a report titled Utilization of the Regents Educational Television Broadcast Programs. It is the role of the educator and the architect to understand the needs of facilities and methods for providing them. Essentially the facilities can be broken down into two areas: production, and instruction.



THE PRODUCTION CENTER must house two major functions. One includes the staff and administration concerned with planning, storing resources, and scheduling. The second function is that of the engineering, the actual presentation of the lessons. Technical staff and equipment, except for on-location work, would be located here.



THE INSTRUCTIONAL AREAS are those parts of the plant where students receive and learn television instruction. Large-group areas, discussion and project areas and even individual study spaces may form the structure of these facilities.

The economics in providing production facilities is a problem; often a regional center may be built to house these functions. See Section 9.

Types of Facilities

The instructional facilities needed to support television should be designed to aid in every way possible this method of communication. Spaces should provide for some flexibility in arranging group sizes for viewing television and then for reviewing lessons. Lighting, acoustics and mechanical considerations should be made in adapting spaces to functions. Generally the facilities implied include,

- The large-group instructional space created to accommodate large numbers for viewing. (see Section 1).

- The traditional classroom can be used to receive TV if proper viewing conditions are provided. The installation costs of closed circuit TV in existing facilities, however, may be exhorbitant.

- Follow-up spaces for discussion and project work may be needed; these may be separate rooms or divided-off parts of existing rooms.

- The individual study spaces where students can go to use TV for review, reinforcement, or even total learning may be used.

PROGRAMMED INSTRUCTION

Programming Defined

"The term programming refers to the process of constructing sequences of instructional material in a way which maximizes the rate of acquisition and retention, and enhances the motivation of the student."

-- Newer Educational Media

Reactions to Programmed Instruction

The development of programmed instruction, or teaching machines as they are often incorrectly labeled, has been accepted with mixed reactions.

PROGRAMMED INSTRUCTION [CONT'D]

One reaction, unfortunate and unjustified, speaks of its threat to teachers' jobs and to their individual expression. Other reactions view it as a method for more effective instruction.

One fact that many people have misconstrued is that programmed instruction is anything new. In history, it can be said to be as old as Socrates, for it is really nothing more than tutoring. As we think of it in the modern sense, it has been studied and applied since the 1920's.

Educators must emphasize that the role of programmed instruction as an educational medium is that of making more information available on an individual basis, freeing the teacher to work with students in desperate need of help.

The Two Components

Programmed instruction may be said to be made up of two basic components:

- THE PROGRAM, which is the sequential body of information to be relayed to the learner.
- THE CARRIER, which is the means by which the program is carried to the learner.

These are often confused. Programmed instruction is, as we have said, simply the combination of the two -- too often it becomes synonomous only with the carrier device.

The Program

Assuming that a carrier can be devised to transmit it (which is not always a valid assumption in 1965), the program is the most important and intracite part of this medium. In short, it must provide all the functions of a good tutor, which includes:

- Providing for constant interchange between it and the learner.

- insisting that a point be thoroughly understood before the learner is allowed to move on.

- Presenting material only for which the student is already prepared.

- Helping the student come up with the right answer through a logical, orderly construction of the program; and it must provide hints, prompts, and cues as necessary.

- Reinforcing the student with every answer.

The programs are most often prepared by specialists with experience in educational psychology. These persons must be able to specify as accurately as possible, the repertoire of behaviors they are looking for, and then break down these behaviors into their elementary components. They then try to reconstruct the learning act, and write the program accordingly. Finally these programs must be tested and improvements made before they are extensively used. Final adaptations may have to be made to fit the program to a carrier.

The Carrier

Many types, shapes and sizes of carriers are used to present the programs. They range from the complex computer, designed to handle any number of systems, alternate paths, branching programs, evaluating devices, etc, right down to a simple push button device, not unlike a response system.

Finally the carrier may be no more than a rather conventional looking textbook, although the arrangement of type within the covers is by no means conventional! These programmed textbooks are gaining wide popularity since they are inexpensive, require no technical know-how, and make few demands on facilities to support them.

The Teacher's Role

The decision to use programmed instruction in the school curriculum, either in adjunct form to already existing instruction, or as whole courses in

PROGRAMMED INSTRUCTION [CONT'D]

themselves will have certain effects on the role of the teacher. First, he will have to be trained in its uses and limitations. He must also assume the role of evaluator, both of student progress and the program used. By allowing the media to handle the bulk of his class, the teacher will then have time to spend with students needing further help.

The Students Role

The effect of programmed instruction largely depends on the extent to which it is used. The student may spend only a small portion of his time using the carriers if it is playing only an adjunct role in his instruction. Similarly he may sit for long periods of time if he is taking programmed courses; in this case he must learn to concentrate on learning and acquire motivation from it. The administrator must attempt to relate each of these uses to the ages and maturities of the students involved -- plans have been tried using programmed instruction at all levels.

The Role of the Facilities

Once again the variables are (1) the extent to which the programmed media are adopted, and (2) the types of carriers utilized. Generally these types of facilities are implied:

- Provision of independent study spaces for use of the media. See discussion of facilities under "Individual Student Progress", Section 2.
- Access to programs and carriers must be provided. The library will most likely do this.
- Teacher areas should be close enough to allow for assistance where needed. It should not be necessary for teachers to monitor programmed instruction, though.
- If electronic carriers are used, they may have to be clustered to allow for wiring, etc.
- Centers for development of programmed media, possibly on a regional basis, will be needed.

LEARNING LABS

The Learning Lab Defined

The learning laboratory is a specialized system of aids and media assembled for the purpose of presenting improved communication. These labs are designed to present information; to allow students to actively contribute, participate, and respond; and to aid the student and/or his teacher to evaluate student progress.

Historical Development

Historically the first form of the learning lab was the "language" lab. The first experiment using audio aids for teaching language was a conversational french course produced in England using an Edison cylinder. The date was 1904. In 1918, C. C. Clarke of Yale set forth some "contemporary" principles for the language lab:

- The machine always provides the same model.
- It is tireless.
- It does not replace the teacher.
- Recordings should be made by native speakers.

It is interesting to note that these "contemporary" remarks are still valid today -- at least as far as language is concerned, anyway.

Since that early date, many experiments have been performed in developing effective systems. The use of the tape recorder has made the language lab a very useful aid in instruction. In many schools today the absence of a language lab is considered a sign of a weak educational program; a good example of at least the social pre-eminence that the language lab has attained!

Extending the Role

With the availability of instructional aids and media, the language lab is now being extended for use in other fields:

- Speeches, dramatics, readings.
- Music production and appreciation, study of art masterpieces, etc.
- Science experiments, industrial processes, and special technical learning.

The Purposes of the Learning Laboratory

The purpose of the learning lab (often called a carrel) is to provide improved access to instructional materials of all types: books, audio-visual aids, programmed instruction, etc. These materials may either be provided en masse in a classroom, in project areas, or in individual work spaces. Accomplishing such a purpose would meet the requirements for a perfect medium: to disseminate more information to more people in less time, and at less cost.

SIMULATION: A SPECIAL LEARNING LABORATORY

What is Simulation?

Education has seen true simulation of circumstances to be a near-ultimate in providing close-to-experience instruction. Simulation techniques are being proposed (and some actually constructed) to create a make-believe world, a trip to the moon, a re-enactment of a historic event, or an ordinary situation demanding a learner response. It provides a situation not unlike the television series of the 1950's, "You Are There."

Briefly the aims of simulation are,

- To provide the closest thing to an actual experience.

- To aid in the evaluation of particular skills by observing the response to various situations. The military has taken many strides in providing true-to-life situations under combat conditions, in flight, etc.

- To aid in the instruction of a discipline.

- To more effectively train people for new skills.

Simulation can be produced by the use of various audio and audio-visual aids. For best results, visual material should be shown nearly full-scale and in a surrounding view (360° would be ideal!) Needless to say these are difficult tasks, technically and economically. The programmed material probably necessary to operate this process would be very complex in most cases.

IMPLICATIONS OF LEARNING LABORATORIES

Role of the Teacher

The teacher's new role upon accepting the use of learning laboratories is to aid students in improving weaknesses, developing strengths, and directing individual study. The learning labs will give him more time to plan lectures, tutor individuals, evaluate individual student progress and to undergo continuing education for his own improvement. His capabilities as a creative teacher must also be tapped in providing new motivations, reinforcement, and evaluation techniques.

Role of the Student

The new media systems are designed especially for use by students. It is therefore up to the student to see that he strives to get as much out of these learning labs as possible. As in all technical media systems, the student must also learn the capabilities and failings of the machinery so he does not depend on it doing more than it can!

Role of the Facilities

The use of learning labs is highly important in individual-centered curricula (see Section 2) and their location within the plant, and their specific roles within these curricula are discussed there. This is not meant to imply that learning labs should not be provided in schools where emphasis is not given to independent study; in any school these kind of facilities and opportunities should be incorporated. The type of curriculum used will control the amount and complexity of learning labs needed.

THE LIBRARY

Why the Library?

With many of the pressures acting on education today, particularly those generated by the new aids and media, the role of the school library is requiring new thinking with regard to its nature and its functions.

The Pressures Acting on the Library in the Past

Too often in the past the forces acting on the library were either misdirected or totally extraneous to their reason for being:

- School librarians think that school administrators are trained more in methods than in the arts, and are therefore unsympathetic to their "cause."
- School administrators, in turn, think often of the school librarian as the nineteenth century battleaxe whose duty is to rule the library with an iron hand.
- The philosophy of education (i.e., only the passive participation of the learner) of the past provides little motivation for the student to actually use the library.
- The library is often used as a study hall rather than a place for searching.
- A general consideration often held that the library should only be a storehouse for information is false -- it is designed to be used.

What Should the Library Do?

The effect of turning away from many of these misdirected pressures, and noting some of the new forces acting on the library has been the creation of new names: access centers, resource centers, instructional materials centers (IMC), and others. In reality this new center, no matter what it is called, is really a library. A library that, however, recognizes the need to accommodate many new carriers of information.

The main function, then, of the new library is to provide access to any or all of the information and the carriers of information possible. This access must be provided to students, either as individuals or as group members.

A student should be able to use the library facilities in an individual way; he must have time offered in his scheduleto go to the library to study, to research, or to relax. The library should be available to him when regular classes are not in session. The idea of opening and closing the library with the classrooms actually provides little time for the student to make use of its special resources on his own.

The functions of the library may have to be mechanized to handle students on all levels with a variety of different requests (see Section 6).

Finally the library must provide a comfortable and workable physical environment. This so-called "climate for learning" includes factors of attractiveness, comfort, and convenience.

The Role of the Student in the Library

With these new functions defined, one must search for the implications arising from them as far as the student is concerned. Perhaps the best way to do this is to note the ways in which he will use the library. EFL in The School Library neatly lists them as follows:

- To find answers to specific questions that arise either from the learning process or from ordinary curiosity.

- To go alone or as a member of a committee sent to get information.
- To carry out study hall assignments; that is, to spend a specific amount of time studying in the library.
- To find material for a written report, a book review, debate brief, or research paper.
- To look at motion picture films, filmstrips, or other aids and media. To study with programmed instruction, to listen to phonograph records or tapes, or to listen and record voice for speech and language study.
- To locate quotations, excerpts, or data for speeches or projects.
- To read for just the fun of reading; to browse through current magazines or look at the new book shelf.
- To talk with other students.

The Role of the Teacher in the Library

Also important in drawing implications is to see how the teacher will use the library:

- To confer with library staff on relevant materials for use in class work.
- To preview films and filmstrips; confer on purchase of aids and media, and on local production of same.
- To consult with librarians on book purchases, and on usage problems students may be having.
- To conduct many of his own research projects; that is, using the library as a student does.

What Must the Library Accommodate?

THE KEYS

- Catalogs, indexes, bibliographies, etc. in a form readily accessible to the student.
- The Keys currently take up a good deal of room and are important focal points in the library circulation. This may be changed by mechanization in the library (see Section 6).

THE CARRIERS

- Books or micro-film reproductions of books for use and for archives purposes.
- Magazines, newspapers, pamphlets, brochures, and other periodicals or serials for use and for record.
- Art and music collections.
- Instructional Aids
- Media
- Storage of materials for ready access.

THE MACHINERY

- Micro-film and reading equipment
- Copying equipment.
- Phonographs, tape recorders, etc. for listening. Portable or built-in.
- Projection equipment.
- Media equipment.
- Information retrieval equipment.(computerized)

THE STAFF

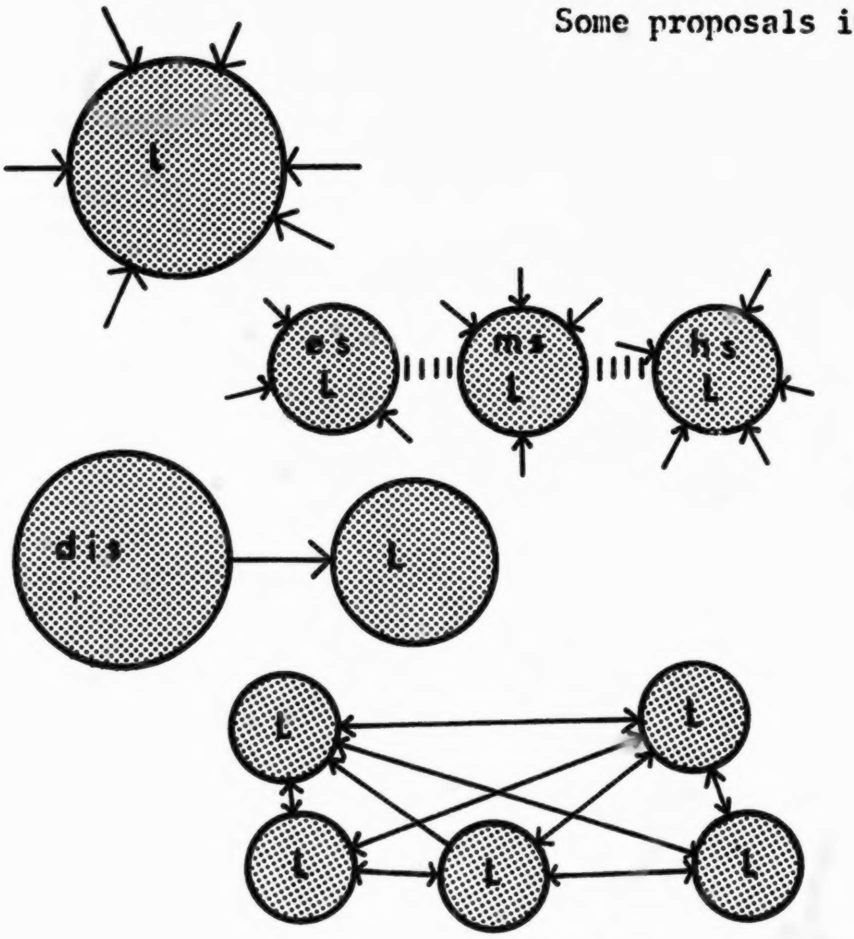
- The library staff, as masters of the Keys, must be available to each student with a minimum of inconvenience and waiting.
- Staff functions, such as reference, circulation control, shelving, etc. must be considered in layout of the library. Mechanization (see Section 6) may make some important changes.

Information Retrieval

This function of the library will become extremely important in years to come. As the body of knowledge grows, methods of cataloging and retrieving it must be developed; these information retrieval systems are designed so that persons may dial or "call-up" information without having to retrieve it from the stacks as is done conventionally.

Library Organization

Before beginning to program and design library facilities, one must be aware of the various methods of organization and operation. A major dilemma in planning the library is an old one: should it be centralized or decentralized? Some proposals include:



- A single central library serving all levels and all needs.
- A system of libraries divided by levels: elementary, junior, senior high, etc.
- A system of libraries divided by disciplines: math, science, etc.
- A decentralized system to the point of having few central facilities at all; use bookshelves in every classroom.

A decision on any one of these facility arrangements depends on a number of factors:

- What is the basic plant organization? (see Section 5).
- What new aids and media will be incorporated in the library?
- How individual-centered is the curriculum? (see Section 2).
- How much can the library mechanize? (Section 6)

In the report published by EFL that has already been noted, the single centralized library is recommended on the theories that knowledge cannot be departmentalized, and that it is most economical to centralize resources to eliminate duplication.

The Role Played by Facilities

The role of the library facilities must consider the ways in which the student and teacher will use it, and what types of instructional aids and media will be employed, either now or in the near future. These functions have been discussed and should be kept foremost in mind by both educator and architect.

The most important facilities that can be provided in the school are those spaces which allow the student to use the materials offered to him. Too often the space devoted to student use in the library is that left over from storage and filing. These all-important spaces should include:

- Individual Study Spaces, called learning labs, carrels, or whatever. They may be assigned to specific students or be allowed to remain on a random-access basis. These are further discussed under "individual Progress," in Section 2.

- Small-group study and group project areas where students can work quietly together, use media devices, or conduct projects.

- Large-group spaces adjunct to the library for instruction in use of facilities. Because of limited use, this should not be a space that is specifically assigned to the library, but one which is ised for other functions as well.

- Circulation must not be overlooked in providing the "climate for learning." Privacy levels should be established and adhered to in designing the library.

Of course the functions of storing and providing access to information and materials cannot be forgotten. Necessary facilities may include:

- Card filing system: can be in large catalog cases, or stored in a computer and "called-up electronically" (see Section 6).

- Control desk: used for checking out books and other instructional aids and resources to students, to assign study spaces, to schedule materials to be distributed, and to co-ordinate group study programs.

- Ready Storage: to provide access to materials for which high demand is anticipated.

- Stacks, storage spaces for books and other instructional materials.

- Central Engineering: spaces to control and operate information retrieval devices, television and video-tape origination, film and tape distribution, and central duplicating services.

Teachers, too, will want to use the library for consulting with students, planning, retrieving materials, self-learning and so on; and spaces should be provided for these activities.

Other facilities may include spaces for computers and their requirements (see Section 6), production areas if desired (see Section 9), and possibly spaces for "call-up" units associated with information retrieval systems.

EXTENDING THE ROLE OF THE SCHOOL

8

AN INTRODUCTION

Pressures to Extend the Role of the School

As more and more people realize the advantages of education both for themselves and for their children, and as the rapid technological pace of our times demands constant re-education, the school must offer more programs than ever before. Rather than discontinuing its influence in a person's life at age twenty, the school must prepare itself to answer the demands of continuing education, for refresher education, for broadening education, and for education of some special segments of our population such as the jobless and the culturally-deprived.

Already some of these programs are in effect. Adult education, for example, is already a fixture in our society. Refresher courses, particularly in industry and in the professions are becoming a way of life. Other areas, such as job retraining and education of the culturally-deprived, are just on the verge of being touched.

In our discussion of these programs, one cannot help but note the necessary overlap and interplay between each of the programs. Within the framework of one the methodology of another may be easily incorporated. Some are tied together, too. Education of the culturally-deprived, for example, may hinge on job retraining programs for parents.

Local and Regional

All of the approaches discussed in this Section may be implemented on a local basis, or may be coordinated through some regional agent. This Section will necessarily limit its attention to the former although regional implications can easily be drawn.

CO-OPERATIVE EDUCATION

A Definition

Co-operative or "work-learn" education is a co-operative arrangement between a school and a business, industry or profession where a student can pursue his education and gain practical experience at the same time. While there are many different kinds of programs to effect this goal, most of them are at the college or junior college levels. Only recently have some been implemented at the secondary levels.

Advantages of the Work-Learn Technique

There are many advantages of this kind of arrangement, not only for the student but for both the participating school or business:

THE SCHOOL benefits through its "in the field" contact with the industry, business or profession. It does not have to be in the position that many schools are said to be in; that is, suffering from the "curriculum gap" between theory and practice. Also at the college level the school may handle twice as many students as it could before, since one-half of the student body is out in the field at any one time.

THE STUDENT benefits from direct and personal experience in both the theoretical and practical elements of his occupation at the same time. He can become familiar with various aspects of the trade or profession, and modify his goals and objectives accordingly. Finally the work-learn programs may provide the necessary financial assistance needed to attain the education.

THE BUSINESS, INDUSTRY OR PROFESSION benefits from the continued contact with the theoretical, too. It can keep up with the advances in the schools; and often employers use the co-operative programs as means to bring new ideas into their organizations. Also the business gets the unusual opportunity to observe and train its future leaders on-the-spot through the work-learn plan.

Organizing the Co-operative Program

The organization of the program may fit any number of patterns, but there are three broad categories that may be identified:

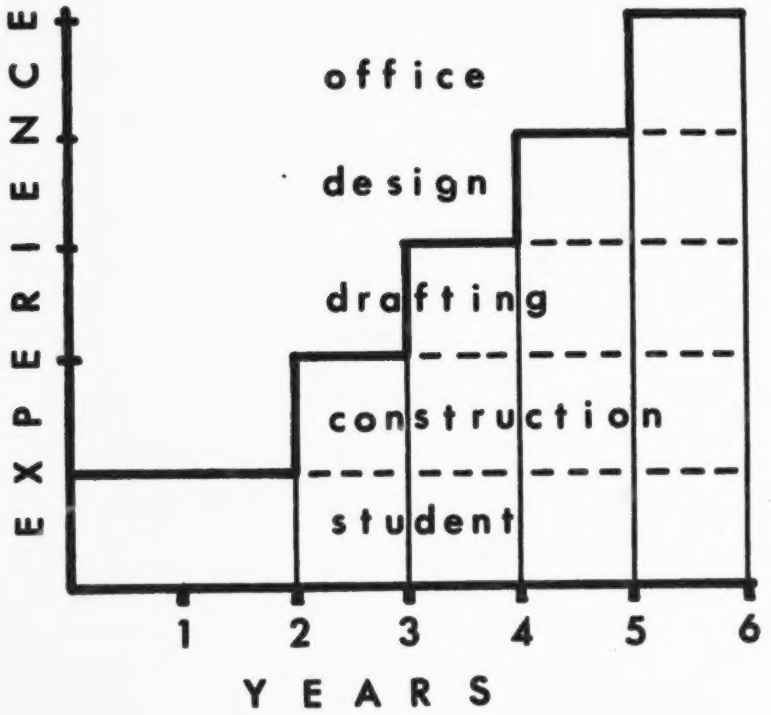
- Full-time work periods alternated with full time study periods.
- Full-time work accompanied or supplemented by part-time study at night, on weekends, etc.
- Part-time work engaged in simultaneously with part-time study.

Full-time Work and Full-time Study

An example of a program utilizing this concept is the college co-operative study plan. Here the college and a specific industry or profession may get together and provide a program where the student spends some semesters in residence at the school, and others in the field. Credit is then given for both aspects. The University of Cincinnati, for example, has established a co-op program in architecture which covers six years. The calendar year is broken up roughly into quarters, and students spend some quarters in the school and some in professional training.

The program, in terms of material covered and sequence followed, is detailed as follows:

- FIRST AND SECOND YEARS, spent as a full-time student at the University.



THIRD YEAR, co-op work in related fields, giving contact with building materials and equipment.

FOURTH YEAR, co-op work in drafting and delineation in an architect's or engineer's office.

FIFTH YEAR, experience in the major field selected.

SIXTH YEAR, experience in the selected field; student assumes some responsibilities in the office.

Full-time Work and Part-time Study	An example of this kind of setup is the night school or correspondence course which is taken in relation to the student's trade or profession. In these arrangements, a certain amount of work experience could count toward the degree.
Part-time Work and Part-time Study	The programs adopted by the military services, where students attend day-sessions at colleges and carry additional training courses required by the military, are typical of this concept. In summer months, the student may be required to complete a tour of duty or go to summer camp. Another application in this area is one which is becoming popular at the high school level; students may receive vocational training half-day and work in selected jobs during the other half. The vocational school is the co-ordinating agent and would probably award the degree.
The Facilities	Since co-op education takes place within the regular school framework, there can be no specific implications for facilities.

JOB RETRAINING

The Objectives

The technological tempo of our times is fast establishing the need to retrain workers who are either out of work or are in danger of losing their jobs to automation or obsolescence. There are two factors, both highly complicated, that must be considered in job retraining programs; first, the need to find an acceptable skill and teach it, and secondly, the need to promote an attitude that will enable these people to continue to learn.

Who Retrains?

The task of job retraining can logically fall to industry, to labor, or to public and private schools, not to mention combinations of the three. The schools will undoubtedly play a large role in these programs, though, because of their special resources (staff, materials, media, facilities), and because of the fact that they are already geared to education, whereas industry and labor may not be.

Approaches to the Problem

Working in conjunction with the school, either labor or industry could initiate any number of job retraining programs using the following approaches:

- Co-operative "work-learn" projects such as discussed in the preceding pages. Full-time work periods may alternate with full-time study periods, or more probably, part-time study would supplement steady employment.

- The use of school facilities to broadcast TV programs either into businesses or into the workers' homes. This might also be done by a local commercial station. While labor or industry could supply the lecture materials (or actually do the lecturing), the school could supply technical facilities and know-how to produce the program.

- School and industry or labor could jointly sponsor correspondence or self-programmed courses utilizing the school's programmed media and evaluation facilities.

Methods of Instruction

The particular method of instruction would, of course, depend on the nature of the retraining program, the time schedule, the subject matter covered, and the number of persons included in the audience. It is conceivable that any or all of the following methods could be used;

- Large-group instruction, with mass media or Response systems (see Section 1).

- Small-group instruction to develop ideas and opinions, either in the home, the business, or other "school-away-from-schools" type of locations. (see Section 5).

- Individualized instruction with programmed materials or individual projects located in the school, the business, or at home. (see Section 2).

Facilities

Once again, there can be no specific facilities pinpointed as necessary for retraining programs. It would seem, however, that if these are conducted outside of the school building, those facilities discussed in the "schools-away-from-schools" concept in Section 5 would have the most applicability.

CONTINUING EDUCATION

Two Aspects of Continuing Education

Continuing education programs are aimed at adults who generally fall into two main categories; those who desire to broaden themselves through taking liberal arts and other general courses, and those who are concerned with furthering their own professional education and in keeping abreast of new developments in their fields.

An Increase in Emphasis

In the forseeable future there will be a rapid increase in the numbers in both of these groups. With the shortening of the work week and the new-found leisure time combined with social pressures for more education, housewives, workers and even retired people will se seeking ways to broaden and elevate themselves. Then, too, there are those who desire to "get ahead" and realize that education is the real key. Finally the professional man realizes that constant refresher education is the only way he can maintain a quality practice, consistent with new developments.

Programs for Broadening Education

The programs for broadening education may fall into two general areas; those taken as part of a night adult-education program, and those taken at home. While the former are convenient to many and afford the advantages of having the teacher face-to-face with the student, expense is an important factor. These adult education programs must, above all, pay for themselves; and not only may the registration fees have to cover the costs of instruction, they may have to include a fee for the use of school facilities.

Courses taken in the home may be offered through,

- Educational television programs in the early morning; or entire television stations designated for day-long educational broadcasting.
- Correspondence courses which may expand into programmed instruction and mailed audio-visual aids.
- Reading courses with published bibliographies and references.
- Circuit instructors who periodically hold seminars with students in rural communities.

Places for Learning

These organizations listed above imply the use of the home or semi-public facilities (such as the meeting rooms in libraries, etc.) as places for learning. Various suggestions are made in the discussion of "schools-away-from-schools" in Section 5. Just what role the school will play in providing these places for learning depends on the financial picture. With taxes already high, the school simply cannot be in a position to subsidize these activities.

The Professional Refresher Programs

The needs of the professional person differ from those of people interested in broadening education. The courses are usually highly specialized and are best accomplished through the use of conferences, clinics, and the professional workshop. A new dimension in this area has been added through the use of FM radio stations (operating, say, between several hospitals in a region) and Tele-Lecture media which can put the lecturer in the same room with the audience, although he may be thousands of miles away.

EDUCATION FOR THE CULTURALLY DEPRIVED

The Essential Concern

Education of the culturally-deprived essentially concerns itself with providing basic education for young people who come from families which have, for many reasons, been unable to provide their children with an adequate cultural background. Not only are these children missing out on many of the benefits of their society, but they may be totally unready to benefit from classroom education once they attain school age.

The families from which these children usually come are often housed in overcrowded dwellings where there is a general lack of concern for mental, emotional and even physical well-being. The parents may be apathetic or openly hostile to educational programs, and make no effort to encourage children to take advantage of them.

The growing number of young people who can be considered culturally-deprived is frightening. In 1950, one out of every four children in four of our nation's largest cities were considered culturally-deprived. By 1960, one out of every three children in the same cities fell in this category. Unless something is done about it, it is expected that this ratio will increase to one-out-of-two by 1970.

Some Basic Problems

All programs to assist the culturally-deprived run up against problems, which solved might change the complexion of things greatly. The first is segragation on account of race, color, and creed. While this does not create cultural deprivation, it certainly contributes; and a true "equal-opportunity" society would help ease the situation. Another problem is that of parental responsibility. Except for a certain amount of natural feedback into the home, programs to aid the culturally-deprived can do little to strike out the cause at its roots. Consequently, the most effective projects might be those which are combined with adult job retraining programs, etc.

What These Programs Should Provide

Even in the face of the basic problems, education can have a tremendous impact on the situation. No Room at the Bottom outlines some eighteen recommendations for meeting the needs of the culturally-deprived, which are here summarized:

PROGRAMS AND SERVICES

There should be programs in the pre-school years which develop a foundation of health, a sense of value and responsibility, and an optimistic anticipation for school. These programs should take place in the home, and also in day-care centers, nursery schools and kindergartens. These opportunities should be offered to every child:

- Supplemental health care
- Individual attention
- Group play and activities
- Words, books, art, music
- Construction and mechanics

For the older children remedial services such as the following should be considered:

- Group psychotherapy
- Social workers to assist neighborhood clubs and gangs.
- Programmed instruction
- TV programs that arouse interests in new areas.

CURRICULUM

Curriculum units that are relevant to the present lives and interests of the students should be developed. Units for lower-class youths should emerge from the daily lives and concerns of the learners. Commercial television, comic books, hot-rod magazines and the like often provide the starting points. Curricula and methods should be developed that emphasize the active, motoric, concrete, practical and dynamic. These children will learn better by being up, around and into things than by sitting for a long time at a desk. In many respects the best educational environment may be more like a camp than a classroom.

Excursions and visits should play an increasing role as children grow older. Studies have shown that in lower-class neighborhoods people seldom venture far from their homes, and children have inadequate conceptions of institutions and resources outside of their own neighborhood,

Curricula and methods should be developed that challenge pupils to inquire and to discover. Teachers as well as pupils should join into the inquiries and experiments.

The curriculum should provide smooth and natural transitions to future education. There should be no sharp break which suggests a stopping point or which requires a deliberate decision to continue. Junior high school should merge with senior high school, and senior high with college.

TEACHERS AND TEACHING METHODS

Teachers who are especially committed to serving disadvantaged youngsters should be enlisted. This implies smaller classes to maximize the opportunities for teachers to help each child at his own level of need. Helping factors include:

- Special workshops for teachers
- Help of social scientists and other experts
- Adequate materials and resources
- Strong community relationships

Positive reinforcement should be exclusively used. Programmed instruction may be used to inspire self-confidence. Also, more and better opportunities for pupils to cultivate self-insight should be provided.

EXTENSION PROGRAMS

Further Extension

This topic will hopefully catch the loose ends in our discussion of extending the role of the school. Discussed will be other programs which are offered by the school, in addition to regular courses, for the benefit of the community. These programs are primarily aimed at problems to which the school has resources available for solution. These resources may include specialists, research personnel, equipment, and facilities. While the community may receive the material benefits of these programs, the school does not come out on the short end; it necessarily gains by extending its influence and prestige in the community. The school also gains the satisfaction of knowing that it may be playing a votal role in the community.

The Academic Programs

The academic programs for extending the role of the school utilize the formal educational plant and organization to solve certain problems:

- Retraining programs for the unemployed.
- Continuing education programs for those who wish to broaden themselves, or to keep up to date with technical developments.
- Programs for the culturally-deprived.

Each of these problems has been discussed in other parts of this Section, and further comment is not needed.

The Non-Academic Programs

The non-academic programs are often organized like businesses: services are either provided for compensation or for goodwill value. These services are not designed to compete with private enterprise and are usually directed at specific groups or areas. Some of these programs might include:

- Medical and dental clinics, and counseling services for people who cannot afford them.
- Publication of research projects which may be sent to special groups (such as farmers) for in-the-field uses.
- Dissemination of information using books or pamphlets to reach special groups.
- Establishment of speakers' bureaus, in order to share the talents of the staff with the community.

Sharing Facilities

In addition to non-academic extension programs, the school can extend its influence by sharing or leasing facilities and equipment. These facilities may include,

- Library and information centers.
- Museum and display facilities.
- Gymnasium, athletic fields, courts, etc.
- Computers and data-handling facilities.
- Origination and production centers, broadcasting facilities, etc.

DEVELOPING CO-OPERATIVE RESOURCES AND SERVICES

9

THE NEED FOR CO-OPERATIVE DEVELOPMENT

Growth of the Education Industry

As the size of our educational machine grows larger and larger, many implications for co-operative development of resources and services arise. One begins to forsee the need for new echelons or levels of organization between the local school and the state-wide education agencies. Aside from the general growth of education, there are many other reasons dictating the need for these co-operative projects:

Supporting Materials, Aids and Media

The expanding role of instructional aids and media in the communicative process was discussed in Section 7. Any institution that begins to incorporate these aids and media into its program will want to become involved in their production. While many such materials are commercially available, there are never enough to cover the range required by the teacher.

Some in-classroom production of materials has always been done; but as the need increases, and as production begins to invade the technical areas, the teacher cannot produce all he needs. Likewise factors of expense and the need to utilize the teacher's time would seem to suggest a centralization of this activity.

The problem is in how far to go in centralizing, Production of instructional aids in particular is a process that should lie close to the teacher so he may supervise, criticize, or even participate in their production. More expensive operations, such as the production of films and the origination of television programs may need to take place at higher levels than the individual school.

Dissemination

With the growing body of information, and the inability of the individual library to keep up with it, what implications are there for more regional centers to accomplish this dissemination?

Also, why can't the dissemination of aids and media be set up on a more regional basis, thus allowing a greater selection than any one individual school could afford?

Services to Smaller Schools and Districts

In many cases schools have either chosen to, or have been forced to, remain small. While there are many advantages inherent in the small school, there is also one great disadvantage: many so-called "desirable" programs simply cannot be put into effect because of tight budgets, lack of staff or resources, or insufficient demand.

Why cannot smaller schools (or more probably, smaller school districts) get together and co-operatively provide these additional services that each could not afford on its own? Likewise, what about schools that already have adequate programs but who desire to provide even more services?

Theory vs Practice, and the Need to Experiment

With so many approaches suggested for solving the problems of educating our nation, many are discarded even before they are put into operation on a scale great enough to evaluate them. Often the reasons put forward are lack of cash, time, talent, or facilities. Once again, why can't schools get together, either among themselves or with a university, and provide some kind of regional demonstration center where these approaches can be tried, observed, and evaluated?

The Need to Economize on Services

Are there certain services to individual schools or school districts that can be more economically handled on a larger scale? How about computer facilities? How about the purchasing of supplies? Certainly there are many more.

AN INTRODUCTION

A Multitude of Possibilities

Since very many aspects of operating the school can lend themselves to co-operative development, or handling on a higher level to achieve some economy or efficiency, this Section can only hope to spotlight some of the more common movements afoot today.

Without going into a great deal of detail, we plan to look at these possibilities for co-operative development of resources and services:

- Production of instructional aids and media, and origination of TV broadcasting. These are fields which, due to the increased needs and expenses, readily lend themselves to some kind of co-operative effort.
- Boards or centers for the provision of all kinds of co-operative services. These cover many fields which each individual member school could not hope to provide on its own, but could gain from the co-operative program.
- Regional centers for research and development of curricula, new innovations and methods. These could co-ordinate advances in theory with practical applications, and might run demonstration and evaluation projects of their own.
- Information pooling and dissemination possibilities.

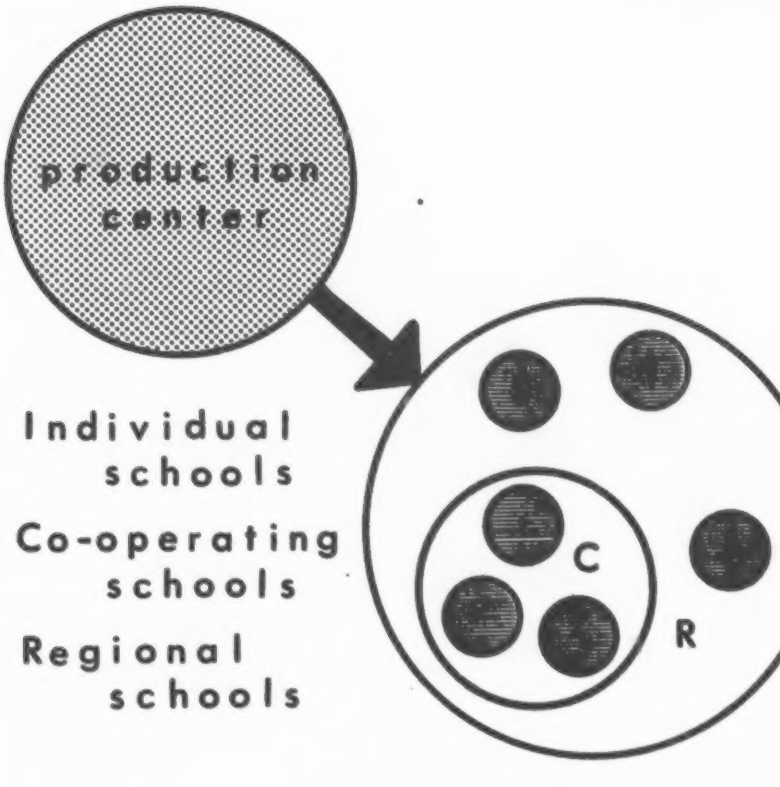
As mentioned above, these only highlight some possibilities for development. There are many more.

THE PRODUCTION OF INSTRUCTIONAL MATERIALS

The Need for Co-operative Production and Origination

With the increased emphasis on using instructional aids and media in the school (see Section 7), the school will undoubtedly want to get into the production of its own supporting materials and broadcast media. While there are many commercially available graphics, posters, models, films, slides and so on, there is always a need for some grass-roots production of these materials. Most teachers find it a great help to be able to personally write the specifications for needed materials; sometimes they will want to assist on their production.

Using television as a media resource (see Section 7) requires a certain amount of technical know-how and equipment. While all the school may need for minimal use is a collection of TV sets, the chances are that it will want to move into some video-taping and broadcasting of its own.



The individual solutions to the problems of production of aids and media will vary, but there are great implications for doing this on a level above that of the individual school. For purposes of presentation we will call such a co-operative facility a production center. This center may be located in a large school to serve it and others; or it may be established by a number of co-operating schools or districts; or it may be set up on even a more regional basis, serving many schools.

Objectives of the Production Center

Normally the objectives of such a center are,

- The production of instructional aids and media (including broadcast and televised programs) for teachers to use in instruction.
- The production of display graphics for students and teachers for use in exhibits, reports, publications, etc,
- The production of visual materials for use by the administration.
- The production of aids and media for use in continuing education, extension programs, and other projects aimed at enlarging and extending the role of the school. (see Section 8).

Basic Functions of the Production Center

The basic functions of this production center may include any or all of the following:

- Lettering, illustrating, mounting, coloring of visual presentation graphics and displays.
- Photography and production of slides, films, filmstrips, projector transperencies, etcs.
- Building of models and other 3-D aids.
- Recording of audio material for playback or inclusion on sound tracks.
- Simultaneous relaying of on-the-air television programs; taping of on-the-air programs for future use; studio origination of TV programs; and co-ordination of TV origination from remote locations such as labs.
- Research and experimentation in aids and media.

- Storage and dissemination of materials.

Advantages of the Production Center

The advantages of the center are, first, that high quality aids and media can be made available to student, teacher and administrator. Secondly, there is an element of savings since the production function is centralized, eliminating waste and duplication. Finally the production of aids and media can be put into the hands of competent full-time personnel.

Organization of the Center

The production center would most likely be run by a full-time co-ordinator with assistance as necessary. There are also implications for help from students (for cash or for course credits) interested in the fields of illustration, photography, electronics, and television.

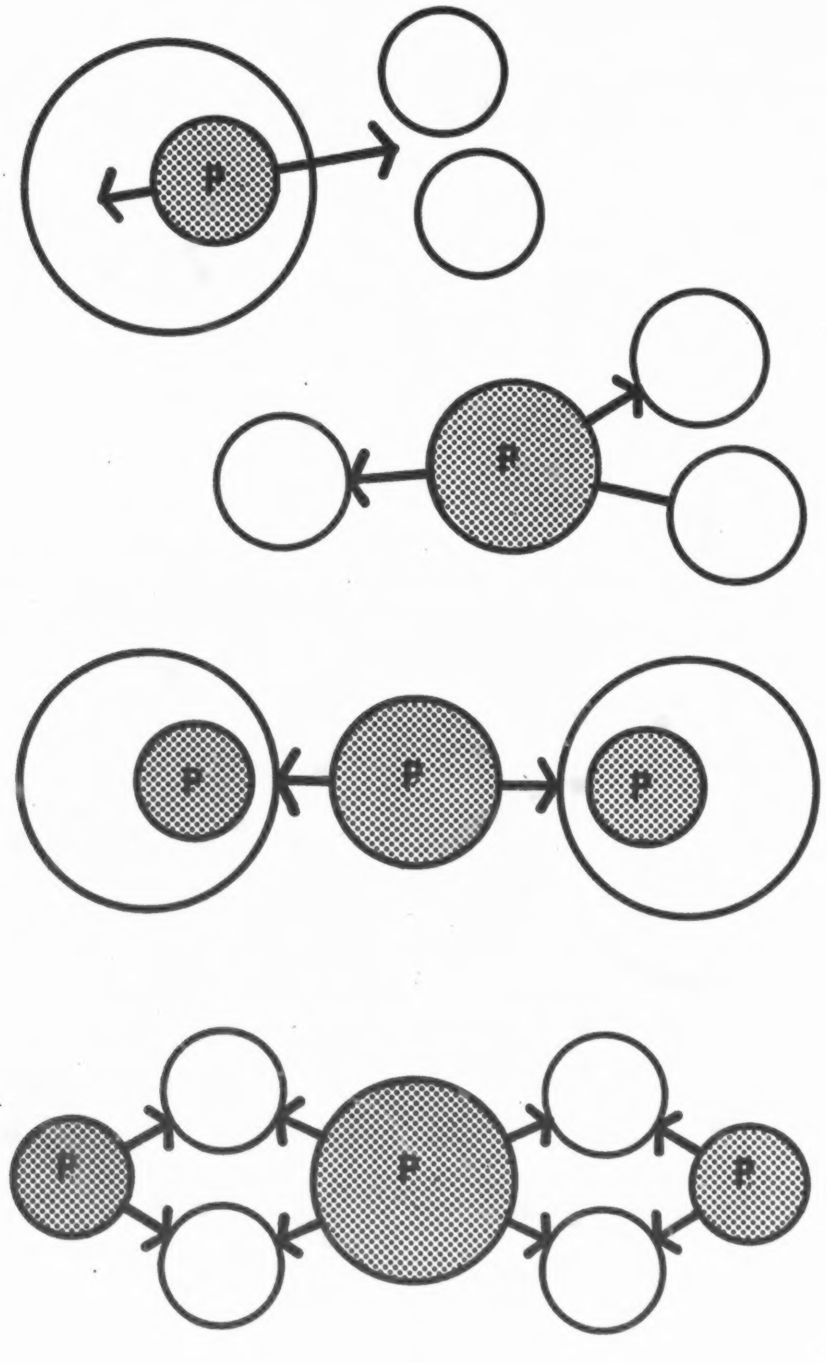
Advantages for the Teacher

The teacher would be able to improve his presentation of material with the availability of the high quality aids and media. Rather than use materials which are inferior, irrelevant, or ill-timed, he can obtain materials made to his own specifications. Putting the task of producing these aids in other hands should give the teacher more time. Finally the teacher can gain greater insight into what he is presenting by forcing himself to write a tight specification requesting supporting materials for it.

The Form of the Production Center

We must be careful not to restrict the use of the phrase "production center" to mean a single centralized facility.

As we have already noted, the production center can take on many forms, and can be found at many different levels of regional organizations.



First, the production center can be located as a single facility within the school plant serving the school and others outside it.

Second, the production center may be established totally outside of the individual school, serving many such buildings.

Third, there may be a single center located outside of the individual schools handling only the most expensive functions (broadcasting, etc.) leaving the others to be handled in smaller production centers in the individual buildings.

Fourth, there may be many such centers; some serving many districts (again providing the most expensive functions) while others may answer the needs of smaller numbers of schools or districts.

Implications for Building Design

The point must be made that no matter what the size of the program, it should be studied carefully before facilities are designed to house it. Darkroom needs, previewing areas, broadcast studios, need for acoustical treatments and isolation are some of the many factors that should be designed into facilities rather than applied at a later date.

Two publications, Improving the Learning Environment, and New Spaces for Learning, devote much time and effort to the discussion of facilities for these kind of programs.

CO-OPERATIVE SERVICES

Many Tasks to be Done

In addition to the functions of producing and originating aids and media, there are a multitude of endeavors that can be accomplished co-operatively.

Recognizing the need for at least one echelon of co-operative development above the local level but below the state-wide or nation-wide levels, various co-operative arrangements have been established. In New York State, for example, there exist some 80 or so voluntary Boards of Co-operative Educational Services (BOCES) throughout the state. These boards are created by member schools in the supervisory districts, who pay for services in proportion to which they receive them. Additional financial support is provided by a high amount of state aids.

Other states establish legally-constituted intermediate districts which also handle certain legal chores such as fixing school boundaries and enforcing state codes on teacher licensing, accounting, etc. Other boards may be strictly voluntary efforts, such as the association of school districts in St. Louis County, Missouri, which provides audio-visual materials distribution.

The jobs that many of these co-operating boards have undertaken cover a wide range of educative and administrative services. They may include:

- Provision of adjunct and part-time staff for smaller schools:

  Administrative and guidance
  Adult education

Psychology and psychiatry
Health and dental hygiene
Cafeteria management
Library services
Vocational training and staff
Art and music staff

- Provision of actual facilities (where possible) for some programs which none of the member schools could economically provide on their own, such as auto mechanics, beauty culture, etc. In this case students may be spending half the school day in their regular schools and the other half in the co-operative school.

- Provision of special programs for the mentally retarded, the culturally-deprived, for gifted children, and for drop-outs.

- Curriculum research and evaluation. Institution of pilot programs in member schools.

- Clearing house for studies and surveys of new approaches, innovations, etc. Dissemination of information on these developments to administrators and teachers through workshops, publications, etc.

- Production and origination of aids and media. Conduct of research into these methods, testing and selection of equipment for member schools. Demonstration center.

- Central library facility for aids and media.

- Professional library for administrators and teachers.

- In-service training of teachers including conferences and workshops. Courses may even be given for college credit.

- Counseling and advisory services for teachers and administrators.

- Personnel services including central interviewing and master file for applications.

- Data-processing center to handle school scheduling, class lists, attendance reports, exam grading, report cards, budgeting, purchasing, inventory control and statistics evaluation.

- Co-operative bidding and buying of goods.

- Process and audit of budgets.

- Major maintenance services, and central supply of materials.

The essential point to remember is that these co-operative boards are usually set up to perform services which member schools cannot economically or efficiently undertake themselves. They are essentially functional, as opposed to being essentially consultants, which is the subject of the next portion of this Section.

The Implications for Facilities

The implications for facilities are necessarily vague, depending on the co-operative services rendered. The board, or whatever it may be called, may operate out of a small office or it may be in a position to build a facility of its own.

An Office of Education project directed by Jack Tanzman, A Study to Explore the Feasibility of a Regional Educational Communications Center, makes one specific proposal for housing such a regional center.

REGIONAL RESEARCH AND DEVELOPMENT

What Can They Do?

The regional research and development center would probably be setup in conjunction with a university and would work in partnership with local schools and boards of education to conduct research, initiate innovation, and supervise experiments in new techniques, curricula and instruction devices.

Characteristics of the Research Center

The regional centers would be staffed by people who understand the theory and practice of curriculum and instruction (education professors, technological people, etc.) and who are interested in advancing the causes of these areas.

Financial support would probably come from government agencies, private foundations, and participation fees paid by member schools.

These centers would serve primarily as consultants leaving actual services to be performed at lower echelons, closer to the grass roots. A wide range of clinics, refresher courses, summer institutes for teachers and administrators could be offered.

There are also implications for setting up types of demonstration centers for visitors to observe new techniques in action, and to conduct research and evaluation studies on these approaches.

A prime function would be the dissemination of information relative to change and innovation; and a general job of trying to bring about general public understanding of these techniques.

INFORMATION POOLING

The Need for Co-operative Information Access

Another possibility for co-operative development lies in the field of information access. It has been pointed out that the traditional goal of one million volumes as the "optimum" in college libraries is being doubled. The need to accommodate the information explosion is a problem that many libraries and schools have no idea of how to cope with.

Pooling of Resources

While a few solutions have been put forth in this area of information access, there seems to be strong implications for one just on the horizon now: the pooling of information resources. Several colleges, for instance, could band together on a mutual information retrieval line, and each could specialize in the type of information supplied, College A could be the engineering center, College B the medical center and so on. Rather than requiring each school to carry a comprehensive library, information may be received and transferred from library to library as needed; each school could then concentrate only on its specialty.

This is, of course, not limited to colleges or even schools in general. The bibliographic MEDLARS program (Medical Literature Analysis and Retrieval System) at the National Library of Medicine is an example of the possibilities in this field. Here a computer handles requests from doctors who wish to gain information in specific fields or cases, and prints out information sources for them immediately.

BIBLIOGRAPHY AND INDEX

BIBLIOGRAPHY

SECTION 1 : ORGANIZING STUDENTS IN GROUPS

Brown, Jose W., *Student Response Systems*, A paper presented at the 18th National Conference on Higher Education, Chicago, March 1963.

Gassman, Morton C., Green, Alan C., Hauf., Harold, and Koppes, Wayne F., *New Spaces for Learning*, Rensselaer Polytechnic Institute, Troy, 1964.

Hatch, Winslow R., *New Dimensions in Higher Education: Effectiveness in Teaching*, U.S. Office of Education, Washington, 1963.

Koppes, Wayne F., Green, Alan C., and Gassman, Morton C., *Design Criteria for Learning Spaces*, Rensselaer Polytechnic Institute, Troy, 1964.

Mayhew, Lewis B., *New Frontiers in Learning*, A report of a conference sponsored by Stephens College and Educational Facilities Laboratories, Columbia, Missouri, 1954.

Mosel, James N., *The Learning Process*, an address given at George Washington University, April 1963.

New Schools for New Education, Educational Facilities Laboratories, 1961.

Nimnicht, Glendon P., and Partridge, Arthur R., *Designs for Small High Schools*, School Planning Laboratories, 1962.

Shaplin, Judson T., "Team Teaching," *American Education Today*, New York, McGraw-Hill Book Co., 1963, pp. 211-217.

Stoddard, Alexander J., *Schools for Tomorrow: An Educator's Blueprint*, The Fund for the Advancement of Education, 1951.

Torkelson, Gerald M., *The Teaching Process*, an address given at George Washington University, April 1963.

Trump, J. Lloyd, *Images of the Future*, National Association of Secondary School Principals and the Ford Foundation, 1959.

Washington County Closed Circuit Television Report Educational Facilities Laboratories, 1963.

Wolfe, Arthur B., and Nova Staff Members, *The Nova Plan for Instruction*, Fort Lauderdale, Broward County Board of Public Instruction, 1962.

SECTION 2 ::ORGANIZING CURRICULA FOR INDIVIDUAL DIFFERENCES

Burton, William H., *The Guidance of Learning Activities*, New York, Appleton-Century-Crofts Inc., 1962.

Brown, B. Frank, *The Non-Graded High School*, Chicago, Prentice-Hall, Inc., 1963.

Ellsworth, Ralph E., and Wagener, Hobart D., *The School Library*, Educational Facilities Laboratories, 1963.

Goodlad, John I., and Anderson, Robert H., *The Nongraded Elementary School*, New York, Harcourt, Brace, and World Company, 1963.

Hatch, Winslow R., and Bennet, Ann, New Dimensions in Higher Education: Independent Study, U.S. Office of Education, 1963.

High Schools 1962, Educational Facilities Laboratories, 1962.

Parker, Don H., Schooling for Individual Excellence, New York, Thomas Nelson and Sons, 1963.

Read, Edwin A., and Crnkovic, John K., The Continuous Progress Plan, Brigham Young University, 1963.

Spear, Michael D., The New School, an unpublished thesis for the degree of Bachelor of Architecture, Rensselaer Polytechnic Institute, Troy, 1964.

Study Carrels, Educational Facilities Laboratories.

Systems Development Corporation, System Design for a Continuous Progress School, SDC TM 1493/103/00, 1964.

Williams, Robert G., Bassett High School: A Frontier in Secondary Education, 1962.

SECTION 3 : ORGANIZING STAFF FOR EFFECTIVENESS

High Schools 1962, Educational Facilities Laboratories, 1962.

Schools for Team Teaching, Educational Facilities Laboratories, 1961.

Spaces for Teachers, Western Regional Center, Educational Facilities Laboratories.

Trump, J. Lloyd, Images of the Future, National Association of Secondary School Principals and the Ford Foundation, 1959.

Von Stoephasius, Renate, and Murphy, Judith, editors, Decade of Experiment: 1951-1961, The Fund for the Advancement of Education, 1961.

Wolfe, Arthur B., and Nova Staff Members, The Nova Plan for Instruction, Fort Lauderdale, Broward County Board of Public Instruction, 1962.

SECTION 4 : ORGANIZING TIME FOR EFFECTIVENESS

The Homestead Design, a modular class period plan developed through Stanford University for some schools in Cupertino, California.

The Marshall Plan, John Marshall High School, Portland, Oregon.

Nova High School: Data Processing Procedure and Administrative Guide, September 1963.

Read, Edwin A., and Crnkovic, John K., The Continuous Progress Plan, Brigham Young University, 1963.

Tickton, Sidney G., The Year-Round Campus Catches On, New York, The Fund for the Advancement of Education, 1963.

SECTION 5 : ORGANIZING PLANT FOR EFFECTIVENESS

Bricks and Mortarboards, A report on college planning and building, Educational Facilities Laboratories, 1964.

High Schools 1962, Educational Facilities Laboratories, 1962.

Hocking, Elton, Language Laboratory and Language Training, Department of Audiovisual Instruction, Monograph 2, 1964.

Kurland, Norman D., Stay-At-Home Classrooms -- A New Educational System for Space Age Adults, a memorandum to the New York State Education Department, March 1963.

Newton South High School, Profiles of Significant Schools, Educational Facilities Laboratories, 1960.

Planning, Action, Success, Clark County School District, School Planning Laboratory, 1960.

The Cost of a Schoolhouse, Educational Facilities Laboratories, 1960.

The University Schools: Nursery School Through The Senior High School, School of Education, Indiana University.

Two Saginaw Middle Schools, Profiles of Significant Schools, Educational Facilities Laboratories, 1960.

Williams, Robert G., The Bassett High School: A Frontier in Secondary Education, 1962.

Willis, Benjamic C., Masiko, Peter, and Erickson, Clifford G., Chicago's TV College, Chicago City Junior College, 1960.

Wolfe, Arthur B., and Nova Staff Members, The Nova Plan for Instruction, Fort Lauderdale, Broaward County Board of Public Instruction, 1962.

SECTION 6 : IMPROVING THE ADMINISTRATIVE PROCESS

Control Data 3600: Preliminary Site Preparation and Installation Manual, Control Data Corporation, Minneapolis, Minnesota.

IBM General Information Manual, International Business Machines Corporation, Endicott, New York, 1962.

Murphy, Judith, editor, School Scheduling by Computer: The Story of GASP. Educational Facilities Laboratories, 1964.

Nova High School: Data Processing Procedure and Administrative Guide, September 1963.

SECTION 7 : IMPROVING THE COMMUNICATIVE PROCESS

Allen, William H., editor, Improving Instruction Through Audio-Visual Media, California State Department of Education, Sacramento, 1963.

Brown, James W., and Thornton, James W., New Media in Higher Education, Association for Higher Education and the Division of Audio-visual Instructional Service of the National Education Association, 1963.

Brown, Jose W., Student Response Systems, A paper presented at the 18th National Conference on Higher Education, Chicago, March 1963.

Busher, W. E., "Information Storage and RetrieVal," Electronics, 29 June 1962, pp 39-62.

Bushnell, Donald D., "The Role of the Computer in Future Instructional Systems", Audio-Visual Communication Review, vol. 11, supplement 7, 1963.

Design for ETV: Planning for Schools with Television, Educational Facilities Laboratories, 1960.

De Bernardis, Amo; Doherty, Victor W.; Hummel, Errett; and Brubaker, Charles W., Planning Schools for New Media, Portland State College (for the U.S. Office of Education), 1961.

Edling, Jack V., editor, New Media in Education, A report of the western regional conference on educational media research, Sacramento, California: U.S. Office of Education, 1960.

Educational Communications Convocation Proceedings, sponsored by the New York State Education Department, Albany, 1964.

Ellsworth, Ralph E., and Wagener, Hobart D., The School Library, Educational Facilities Laboratories, 1963.

Fry, Edward B., Brayan, Glenn L., and Rigney, Joseph W., "Teaching Machines: an annotated bibliography", Audio-Visual Communication Review vol 8, supplement 1, 1960.

Gassman, Morton C., Green, Alan C., Hauf, Harold D., and Koppes, Wayne F., New Spaces for Learning, Rensselaer Polytechnic Institute, 1961.

Greenhill, L. P., Potentialities of Closed-Circuit Television, a paper prepared at Pennsylvania State University, 1959.

Hocking, Elton, Language Laboratory and Language Learning, Department of Audio-Visual Instruction Monograph 2, 1964.

Lenihan, Kenneth J., Mentzel, Herbert, and Spivak, Sydney, Utilization of the Regents Educational Television Broadcast Programs, New York, Columbia University, 1963.

MacMurray, John, "Teachers and Pupils", The Educational Forum, vol. xxix, November 1964.

Morton, F. Rand, and Lee, Wono, "Dial Language", College and University Business, May 1962.

Newer Educational Media, Pennsylvania State University and the U. S. Office of Education, 1961.

New Teaching Aids for the American Classroom, A symposium on the state of research in instructional and tutorial machines, U. S. Office of Education, 1960.

Probst, George E., editor, Programmed Learning: Tasks for the Schools in 1962, Summary of a conference held by the Thomas Alva Edison Foundation and Grolier, Inc., January 1962.

Stewart, Donald K., A Learning Systems Concept As Applied to Courses in Education and Training, a paper prepared at the University of Wisconsin.

Teaching Computer Basics with Minivac 6010, Scientific Educational Products Corporation, 1964.

Teaching by Television, a report from the Ford Foundation and the Fund for the Advancement of Education, 1959.

Washington County Closed Circuit Television Report, Educational Facilities Laboratories, 1963.

Wentworth, John W., "A Systems Engineering Approach to Educational Facilities", Journal of the SMPTE, vol. 72, September 1963.

Willis, Benjamin C., Masiko, Peter, and Erickson, Clifford G., Chicago's TV College, City Junior College, Chicago, 1960.

SECTION 8 : EXTENDING THE ROLE OF THE SCHOOL .

Barnes, Dr. Melvin, editor, Schools for the 60's A report of the National Education Association Project on Instruction, New York, McGraw-Hill Company, 1963.

Cornell University, College of Architecture Announcement, vol. 54, 1962.

bibliography

Dewey, John, Dewey on Education, selections with introduction and notes by Martin S. Dworkin, New York, Teachers College, Columbia University, 1954.

Facing Facts About the Two-Year College, prepared and distributed by the Prudential Insurance Company of America, 1963.

Hatch, Winslow R., New Dimensions in Higher Education: The Experimental College, U. S. Office of Education, 1962.

Kurland, Norman D., Stay-At-Home Classrooms--A New Educational System for Space-Age Adults, A memorandum prepared for the New York State Education Department, 1963.

McGary, Dr. Keith, Experiment to Develop New Teaching and Learning Procedures for the First Year of College, Antioch College, Yellow Springs, Ohio.

Montessori, Marie, The Montessori Method, Cambridge, Massachusetts, Robert Bentley, Inc.

Rhode Island School of Design, 1963-1964 Bulletin, vol. 50, September 1963.

University of Cincinnati, The College of Design, Architecture, and Art.

University of Detroit, Bulletin of the College of Engineering and Architecture, 1963-1964.

Watson, Goodwin, editor, No Room at the Bottom; Automation and the Reluctant Learner, a project on the national implications of Automation by the National Education Association, 1963.

Woodring, Paul, and Scanlon, John, editors, American Education today, New York, McGraw-Hill Company, 1963.

SECTION 9 : CO-OPERATIVE DEVELOPMENT OF RESOURCES

Barnes, Dr. Melvin, editor, Schools for the 60's, A Report on the National Education Association Project on Instruction, New York, McGraw-Hill Company, 1963.

Faris, Gene, and Moldstad, John, Improving the Learning Environment, Washington, Government Printing Office, 1963.

Gassman, Morton C., Green, Alan C., Hauf, Harold D., and Koppes, Wayne F., New Spaces for Learning, Rensselaer Polytechnic Institute, 1961.

Langworthy, Harry W., Better Schools for Rural Youth, A report to the New York State Education Department, Albany, 1959.

Lawrence, Richard W., chairman, Report of the Commissioner's Committee on Reference and Research Library Resources, prepared by the New York State Education Department, Albany, 1961.

index

Ability Grouping, 2-8, 2-9, 2-28
Access Center, see Library
Achievement Grouping, 2-8, 2-9, 2-28
Acquisitions, Library, 6-7
Adjunct Staff, 9-8
Administrative Process
    decentralizing, 5-1, 5-12
    problems, 6-2
    scheduling, 6-4ff
    services, 9-8
Adult Education, 8-1, 8-7, 9-8
Aids, Audio, 7-7ff
Aids, Audio-Visual, 7-11ff
Aids, Instructional, 7-6ff
    defined, 7-5
    large-group instruction, 1-4, 1-6ff
    production, regional, 9-1, 9-4ff
    traditional, 7-6
Air Conditioning
    computer spaces, 6-14
    learning spaces, 1-7, 4-18
Ambient Light, 7-18, 7-19
Anderson, Robert, 2-5, 2-28
Attendance procedures, 6-2, 6-10
Attention span in large-group instruction, 1-2
Audio-visual aids, see Aids

Blackwell High School, 2-34
Boards, Co-operative, 9-8ff
Boards, Intermediate, 9-8
Boards of Co-operative Educational Services,
    (BOCES), 9-8
Broadcasting, 7-10, 7-25, 7-26
    regional, 8-8, 9-4ff
Broadening Education, 8-1, 8-7ff
Brown, B. Frank, 2-25
Budgets, process and audit, 9-10
Businesses, co-operative education, 8-3
Businesses, as schools-away-from-schools, 5-19

Cafeteria
  management services, 9-8
  mechanizing routine, 6-11
  scheduling, 4-8, 4-13
"Call-up," see Information Retrieval
Cameras, television, 7-25, 7-26
Campus, see Educational Park
Card Catalog, Library, 6-7, 6-8, 7-42, 7-44
"Care-taker" Personnel, 4-15
Carrels, see Learning Labs
Cartridge-loaded Projectors, 7-14
Catskill Project, 7-11
Chalkboards, 7-6, 7-14
Chicago City Junior College TV Project, 7-28
Circuit Instructors, 8-8
Circulation
  in computer-run library, 6-9
  in educational parks, 5-10
  in flexible scheduling, 4-10, 4-12
  in large-group areas, 1-8
Clerical Routine, 6-2, 6-10
Clinics, 8-8, 8-14
Closed-Circuit Transmission, TV, 7-27
Commons, Student
  in educational parks, 5-10
  in nongrading, 2-37
  in schools-within-schools, 5-15
Communicative Act, 7-4
Community Centers, as schools-away-from-schools, 5-18
Community Consultants, 3-8
Community, School and, 5-18, 8-13
Computers,
  centers in the school, 6-5, 6-13
  centers outside the school, 6-5, 6-12
  co-operative development, 9-2, 9-10
  design criteria for, 6-13, 6-14
  general characteristics, 6-4
  general uses, 6-10ff
  miniaturizations of, 7-20
  programmed instruction and, 7-33
  registration, 6-4, 6-10
  scheduling, 6-4ff
  tracking progress, 2-31, 6-10
  utilization of, 6-6, 6-10, 6-11
Conflicts, Scheduling, 6-4
Continental Classroom, 7-27
Continuing Education, 8-7ff
  in schools-away-from-schools, 5-18, 5-19
Continuous Progress Plan, 4-11, 2-29, 2-30
Continuous Tape Loops, 7-8
Co-operative Boards, 9-8
Co-operative Buying, 9-10

Co-operative Education, 8-2ff, 8-5
Co-operative Services, 9-2, 9-8ff
Co-operative Teaching, 3-3ff
"Core" Curricula, 2-6, 2-13
Correspondence Courses, 8-4, 8-8
Culturally-Deprived, Education of, 8-1, 8-9ff
"Curriculum Gap," 8-2
Curriculum Research, 2-3
    regional, 9-9, 9-11
Cycle, Scheduling, 4-8, 4-9
Cycling, Teacher, see Teacher Cycling

Dalton Plan, 2-5
Darkening, 1-7, 7-16, 7-18
Data Processing, see Computers
Decentralization,
    administration, 5-12
    independent study areas, 2-22
    library, 7-43
Demonstration Facilities, 9-2, 9-9, 9-11
Discipline-Oriented Schools-Within-Schools 5-11
Dissemination, Regional, 9-2, 9-9, 9-11
Dormitories, as schools-away-from-schools, 5-18
Drop-outs, Student, 2-3, 9-9

Echelons,
    district organizations, 9-1
    educational parks, 5-8
    staff organizations, 3-7ff
Educational Park, 5-6ff
    education of culturally-deprived, 8-12
    nongrading and, 2-30, 5-6
Enrichment,
    individual student progress and, 2-15
    professional, 5-20, 8-8
Evaluation,
    computer-based, 6-1, 6-10
    importance of, 2-18, 2-20, 2-32, 5-13, 6-2
Extended School Day and Week, 4-14ff
Extended School Year, 4-16ff
Extended Time Periods, 4-5ff
Extension Programs, 8-13ff

FCC Licensing, 7-26
Factories, as schools-away-from-schools, 5-19
Failure, 2-2, 2-8, 2-10, 2-25, 2-26
Filmstrip, 7-11
Filmstrip, Sound, 7-12

Film Types (Motion Picture), 7-14
Ford Foundation, 7-25
Front Projection, 1-7, 7-18

GASP System, 6-4
Goodlad, John, 2-5, 2-28
Graded School, 2-4ff
Graphics, Production, 9-5

Handicapped, Education of, 5-20
Homerooms, 2-21, 2-28
Homes, as Schools-away-from-schools, 5-19
Homogeneous Grouping, 2-6
Homogeneous Tracking, 2-6, 2-8ff
Houses, see Little Schools
House Master, 5-14

Image Size, 1-7, 7-18
Independent Study
    individual progress, compared, 2-16
    instructional aids and, 7-20
    large-group instruction and, 1-5
    length of school day and, 4-2, 4-14
    modular periods and, 4-9
    schools-away-from-schools and, 5-16
    team teaching and, 3-4
    television and, 7-29
    time organizations and, 4-13
    Trump Plan and, 3-9
Individual Differences, 2-1, 2-2, 2-5, 2-6, 2-8, 2-9, 2-15
Individualized Scheduling, 2-6, 2-10ff
Individual Student Progress, 2-7, 2-15ff
    independent study, compared, 2-16
    nongrading compared, 2-15
Industry
    co-operative education and, 8-2ff
    job retraining and, 8-5
    refresher courses, 8-1, 8-7
    schools-away-from-schools and, 5-19
Information Explosion, 7-1
Information Pooling, 9-12
Information Retrieval, 5-18, 6-8, 6-9, 7-42, 7-45
In-Service Training, 9-9, 9-11
Instructional Aids, see Aids, Instructional
Instructional Assistants, 3-8
Instructional Materials Center, see Library

Interests, Student, 2-2, 2-10, 2-28
Intermediate Boards, 9-8

Job Retraining, 5-19, 8-1, 8-5ff

Keys, Library, 7-42

Large-Group Instruction, 1-3ff
    job retraining and, 8-6
    schools-away-from-schools and, 5-18
    social structure and, 5-1
    television and, 7-27, 7-28
    Trump Plan and, 3-9
Lamphere High School, 3-5, 3-6
Language Labs, 7-35
Learning Labs, 2-20, 2-21, 2-22, 7-35ff
Lecture, Large-Group, 1-3ff
Library, 7-39ff
    Adjunct staff for, 9-9
    educational parks, 5-9
    individual student progress and, 2-23
    mechanizing functions, 6-2, 6-7ff
    nongrading and, 2-36
"Little Schools," 3-6, 5-12, 5-14
Lockstep, 2-3, 2-6

Magnification, 7-13, 7-14, 7-15, 7-26
Maintenance of buildings
    regional services, 9-10
    year-round, 4-17, 4-18
Master Schedule, 6-4
Media, 7-24ff
    continuing education and, 8-8
    defined, 7-5
    educational park and, 5-6
    individualized scheduling and, 2-12
    individual student progress and, 2-18
    job retraining and, 8-6
    large-group instruction and, 1-6
    learning labs and, 2-22
    nongrading, 2-30
    production, regional, 9-1, 9-4ff
    schools-away-from-schools and, 5-18, 5-20
MEDLARS system, 9-12
Mental age, 2-1
Micro-Projection, 7-16
Microwave Transmission, 7-26

Midwest Program in Airborne Television, 7-28
Miniaturizations, 5-18, 5-19, 7-20, 7-21
Modular Scheduling, 4-7ff
Modular Time Periods, 4-7ff
Mosel, Dr. James, 1-4
Motion Pictures, 7-13, 7-14
    production of, 7-14, 9-4ff
Multi-Age Grouping, 2-28
Multi-Class Teaching, 1-9ff, 2-11, 2-14, 5-13

New York City, A-V distribution, 7-28
Night Courses, 7-10, 8-3, 8-7
Nongrading, 2-25ff
    development of, 2-6, 2-7
    educational parks and, 2-30, 5-6
    student-planned periods and, 4-11
Nova High School, 4-5, 4-6, 4-14

Opaque Projection, 7-15
Open-Circuit Transmission, TV, 7-26
Origination of aids and media, 7-10, 7-25, 9-4ff
Overhead Projection, 7-14

Payroll Routine, 6-2, 6-11
Periods, see Time Periods
Personnel Services, Regional, 9-10
"Phasing" of courses, 2-29
Phonographs, 7-8
Plant, School, 5-1ff
Polarizing Devices, 7-15ff
Pre-School Education of Culturally-Deprived, 8-10
Production of Aids and Media, 7-10, 7-25, 9-4ff
Professional Libraries, 9-9
Professional Teachers (Trump Plan), 3-7
Professions,
    co-operative education, 8-2
    refresher education, 8-7, 8-8
Proficiency Examinations, 5-20
Programmed Instruction, 7-31ff
    continuing education and, 8-8
    culturally-deproved education and, 8-11
    individualized scheduling and, 2-12
    individual student progress and, 2-18
    job retraining and, 8-6
    nongrading and, 2-30
    schools-away-from-schools and, 5-18, 5-19
Programmed Textbooks, 7-33

Projection Methods,
    front projection, 1-7, 7-18
    micro-projection, 7-16
    opaque projection, 7-15
    overhead projection, 7-14
    rear projection, 1-7, 7-18
Projectors,
    cartridge-loaded, 7-14
    micro, 7-16
    motion picture, 7-14
    opaque, 7-15
    overhead, 7-14
    slide, 7-12
Pyramidal Grouping, 5-8

Quarters Plans, 4-6, 4-16
Quincy School, Boston, 5-3

Radio, as instructional aid, 7-10, 8-8
Read, Dr. Edwin, 1-5, 2-29, 2-30, 4-5, 4-11
Rear Projection, 1-7, 7-18
Reception, Television, 7-27
Refresher Courses, 5-20, 8-1, 8-7, 8-8
Regional
    development of resources, 9-8ff
    dissemination, 9-2, 9-9, 9-11
    production of aids and media, 9-1, 9-4ff
    research and development, 9-11
Registration, by Computer, 6-4, 6-10
Reinforcement, by Aids and Media, 7-7, 7-16, 7-22, 7-23, 7-33
Remote-Controlled Projection, 7-12, 7-19
Repeating Courses or Grades, 2-2, 2-8
Research, Regional, 9-6, 9-9, 9-11
Resource Centers, see Library
Response Area, schools-away-from-schools, 5-16
Response Systems, 1-3, 7-21, 7-22, 7-23
Ridgewood High School, 1-4, 3-3

St. Louis County, Co-operative Effort in, 9-8
Scheduling,
    computer-based, 6-4ff
    individualized, 2-10ff
    modular, 4-7ff
    student-planned, 4-11ff
Scheduling Cycle, 4-8, 4-9
Schools-Away-From-Schools, 5-16ff, 8-6, 8-8
Schools-Within-Schools, 5-11ff

Segregation of Races, 5-6, 8-9
Self-Discipline, Student, 2-3, 2-16, 2-19
Simulation, 7-36, 7-37
Single-Concept Material, 7-12, 7-13
Size of Groups, 1-1ff
Size of School, 5-2, 5-4, 9-2
Slide Projectors, 7-12
Slide Projectors, Automatic, 7-12
Slides, 7-12
Small Schools,
  advantages of, 5-1, 5-4
  services to, 9-2, 9-8ff
  multi-class teaching in, 1-9ff
Specialists, Teacher, 3-2, 3-7
Speakers' Bureaus, 8-14
Splinter Courses, 2-11
Staff Specialists, 3-8, 9-8
Student-Planned Periods, 4-11ff
Student Response Systems, see Response Systems
Studio Teachers, 3-2, 7-28, 7-29
Systems Approaches, 7-4

Tape,
  continuous loop, 7-8
  recorders, 7-8
  video, 1-5, 9-4
Teacher,
  adjunct, 9-8
  cycling, 2-18, 2-19, 2-30, 2-32, 5-12, 5-13
  echelons, 3-7ff
  specialists, 3-2, 3-7
  teaming, 3-2ff
  utilization of, 3-1
Teaching Machines, 7-31
"Teacher-Paced" Instruction, 2-3, 2-15
"Teaching Wall," 1-7
Team Planning, 3-2ff
Team Teaching, 3-2ff, 7-28, 7-29
Technological Obsolescense, 6-1, 8-1, 8-5
Tele-Lecture, 7-11, 8-8
Telephone, as instructional aid, 7-10
Television, 7-25ff, 9-4ff
Time Period,
  extended, 4-5ff
  modular, 4-7ff
  student-planned, 4-11ff
  traditional, 4-4
Tracks, 2-6, 2-8
Tracking, Homogeneous, 2-6, 2-8, 2-9
Tracking Student Progress, 2-30, 6-10
Transmission, Television, 7-26, 7-27

Transmitting Area, in schools-away-from-schools, 5-16
Transperencies,
    Overhead, 7-15
    Slide, 7-12, 7-13
Transportation, and Educational Park, 5-7
Trimester Plans, 4-6, 4-16
Trump Plan, 1-5, 3-7ff
Tutoring, Student, 5-8

Unemployment, 5-19
University of Cincinnati, 8-3

Video Taping, see Tape, Video
Viewing Angle, 1-7, 7-14, 7-17
Viewing Area, 1-7
Vocational Programs, 8-4, 9-9

Washington County Television Project, 7-25, 7-27, 7-29
Wayland Senior High School, 1-4, 3-4
Winnetka Plan, 2-5
"Work-Learn" Techniques, 8-2ff, 8-5
Workshop
    Administrative, 9-9
    Professional, 8-8
    Teacher, 8-13, 9-9
"Write-On" Surfaces, 7-6, 7-14

CONSULTANTS

Lee Campion, Director, Division of Educational Communications, New York State Education Dept.

David Crossman, Associate, Division of Educational Communications, New York State Education Dept.

Bernard Cooper, Chief, Bureau of Mass Communications, New York State Education Dept.

Byron Evans, Student Affairs Director at RPI, formerly Superintendent of Schools, Saratoga, N.Y.

John Kessler, Architect, Meathe and Kessler, Grosse Pointe, Michigan.

Norman Kurland, Director, Center on Innovation, New York State Education Dept.

Harry Langworthy, Jr., Associate in School District Organization, New York State Education Dept.

Robert MacCambridge, Associate Director, Office of Administrative Services for Higher Education, New York State Education Dept.

John Price, Associate in Educational Television, New York State Education Dept.

Charles Richter, Superintendent of Schools, West Hartford, Connecticut.

Ted Shunck, Business Manager, Central School District #3, Highland, New York.

D. G. Summerville, Educational Consultant, Engelhardt, Englehardt and Leggett, Purdy Station, N.Y.

Herman Taub, President, Continuous Progress Education, Inc.

Phillip Tyrell, Director, Office of Institutional Research, RPI

Jack Ward, Consultant on Educational Facilities.

Charles Werberig, Office of Institutional Research, RPI

The authors would also like to acknowledge the help of Martin Claydon, RPI Central Duplicating; Ted Huguenin, printer; Mrs Edith Warren and the architecture office staff at RPI; and finally Mrs Hilda Wiens and Mrs. Bonnie Whitney (both teachers!).